The Electrical Industry's Weekly Magazine

February 8, 1960

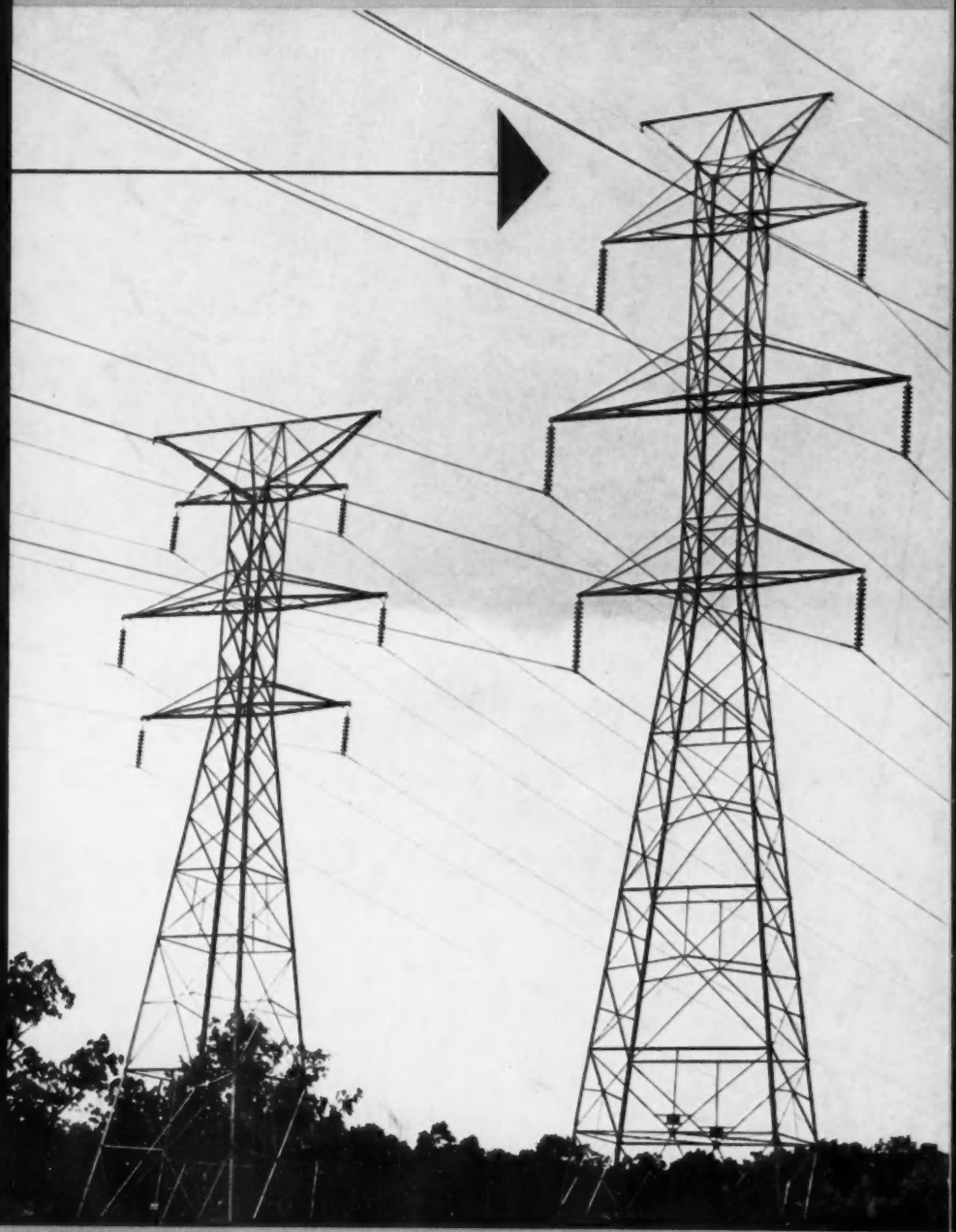
Electrical World

Price 50 Cents

A McGraw-Hill Publication

New 230-Kv Line Design Saves Weight and Height

. . . page 39



Old 138-kv and new 230-kv towers on same right-of-way

National Electrical Week Strives for Wider Scope—

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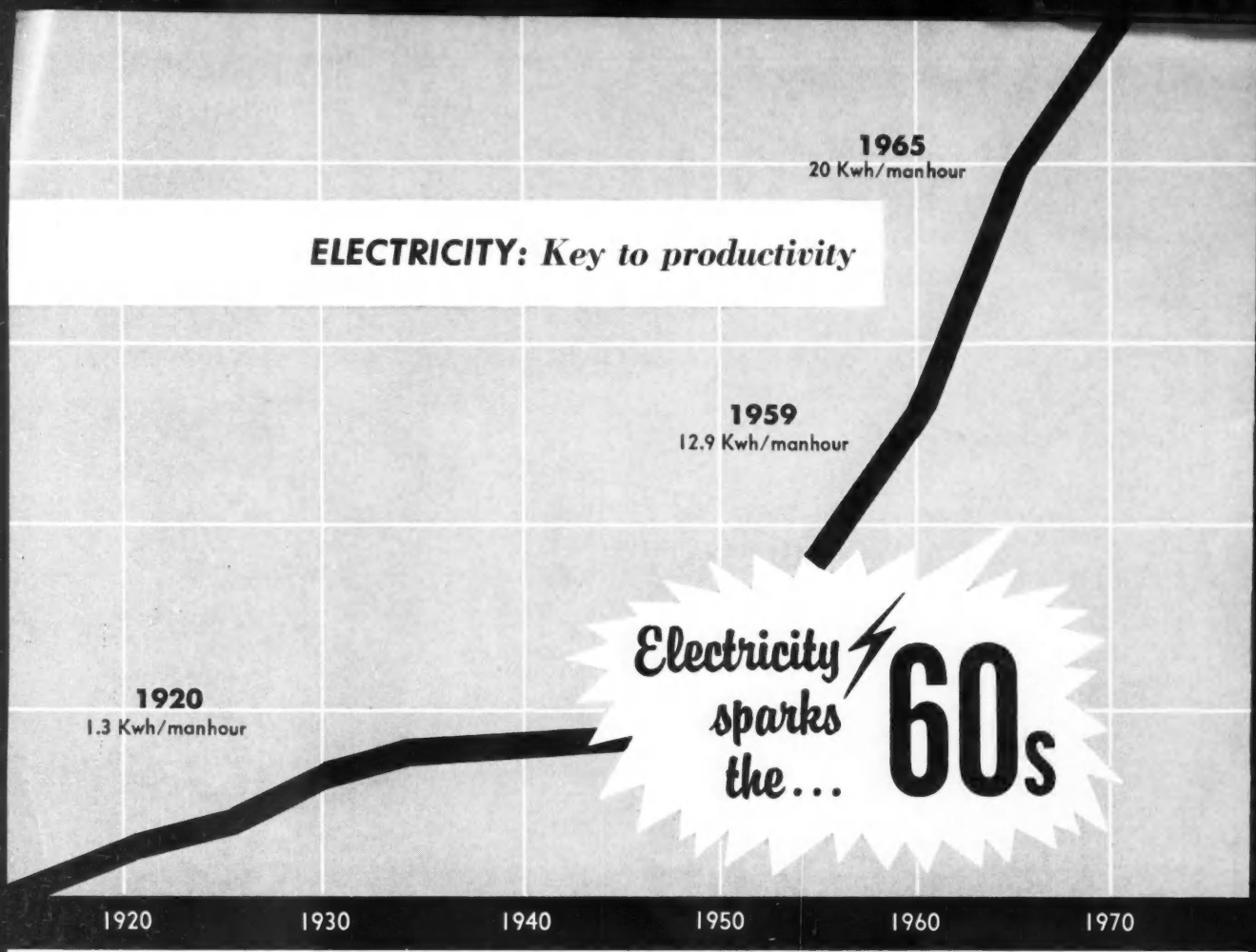


During National Electrical Week
General Electric renews its dedication to work with electric utilities to bring . . .

MORE POWER TO AMERICA

NATIONAL ELECTRICAL WEEK

The curve points upward toward the abundant life. one result of increased productivity. Closely related to increased productivity (our best counter to inflation) is the doubling over the past decade of electrical energy consumed per manhour. Market development helped to create this trend; market development will help to sustain it. General Electric's new Residential Market Development Program will encourage Americans to Live Better . . . Electrically, a possibility which increased productivity puts within their means. The past is prologue to the great years ahead.

950-2

GENERAL ELECTRIC

Electrical World

Vol. 153, No. 6 FEBRUARY 8, 1960

Published for 86 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

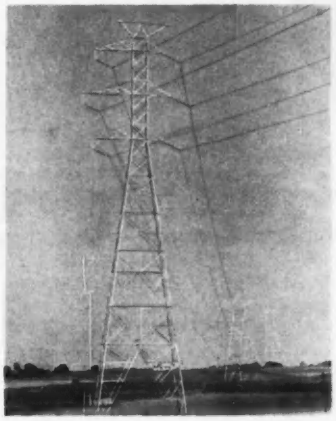
In This Week's Issue

p 36

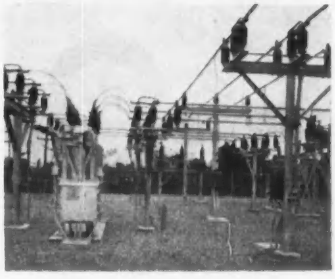
NATIONAL ELECTRICAL WEEK

FEB. 7-13, 1960

p 39



p 45



CURRENT EVENTS

How BPA-California Intertie Shapes Up

Authority's report says 230-kv link to Pacific G&E terminal is feasible from engineering and economical standpoint...p 32

Electrical Week Widens Scope

Utilities, leagues and manufacturers appear to be touching all promotion bases, a few utilities pull in horns.....p 36

MANAGEMENT

Utilities Eye a New Profit Builder

Correct and capitalize, a visionary wiring plan, could be a prescription for many industry ills.....p 63

SUBSTATIONS

Low-Profile Substation Cuts Costs

Burkhard H. Schneider, Detroit Edison Co

Luzon design for 40-kv strain bus steel structures also aids Detroit Edison in obtaining neighborhood acceptance.....p 45

TRANSMISSION

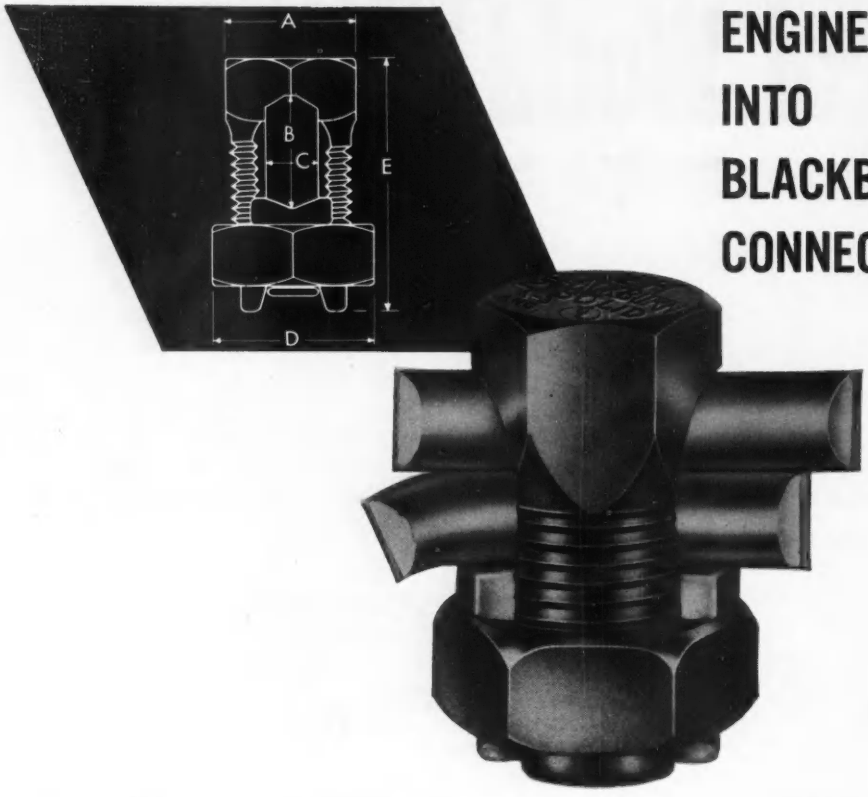
Reshapes 230-Kv Transmission Towers

J. J. Trainor, Public Service Co of Indiana
W. C. Freeman, Sargent & Lundy

Indiana utility builds station-system tie by designing rectangular tower without broken-conductor assumption.....p 39

Departments

Editorials 31
Electric Utility Methods..... 52
Electrical Week 19
Engineering Reference Sheet 50
Executive Reader 22
Letters 5
Management Newsletter ... 63
Manufacturers News 58
New Equipment 70
News About People..... 76
Politics and Public Power... 20
Procurement & Products.... 56
Readers Service 71
Selling 72
INDEX TO ADVERTISERS... 82



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The big difference in Blackburn connectors starts with the way they are made. The basic material is high strength duronze, a silicon bronze alloy stronger than many structural steels.

High percentage of threads, both bolt and nut, plus proper selection of materials, reduces friction, increases thread efficiency and clamping force—clamping force is maintained on the conductors. Blackburn's strict inspection assures uniform high quality.

Blackburn connectors give better performance electrically. The greater thread efficiency provides a high clamping force that helps break through oxides on the conductor and improves conductivity. This high initial conductivity is maintained permanently.

Because of the better materials, precision workmanship and careful inspection, Blackburn connectors are reusable . . . over and over. Write for samples.

LIVE BETTER ELECTRICALLY

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LETTERS

Lauds Safety Coverage

To the Editor:

This is to express my pleasure and appreciation to you and your staff for the generous space you devoted to Safety in the December 21 issue of Electrical World. By so doing, you gave help and encouragement to all the professional safety engineers of the electric public utility industry, particularly to the members of the Accident Prevention Committee of the Edison Electric Institute.

I hope that when the employee injury statistics for 1959 for our industry are assembled and published, the record will show that a lesser number of employees were killed or seriously injured than in the immediate preceding years.

If this be so, then you can feel that you effectively contributed to this improvement.

A. J. Naquin, Chairman
EEI Accident Prevention Committee
New Orleans Public Service, Inc

How Students View Utilities

To the Editors:

I was very pleased to read in Electrical World (Jan. 25, p 5) the letter to the editor, "A Student Looks at Prospects" by Robert L. Hays.

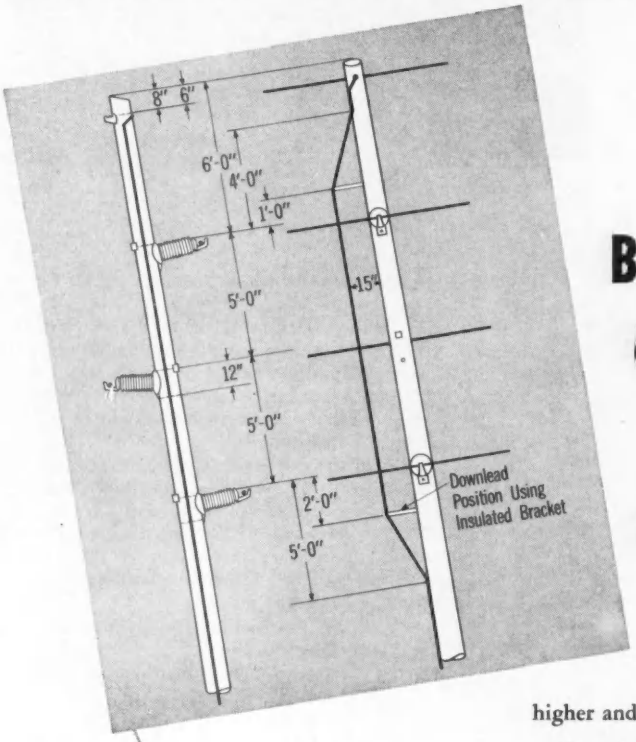
I think that Mr. Hays' letter deserves considerable attention from the electric power industry and that Electrical World should be commended for giving it such wide publicity. It does little good to say that "We doubt that Reader Hays' experiences are typical of the engineering student seeking a utility position." That is of little importance. The real point of interest is that the opinions expressed by Mr. Hays are almost identical with those held by the vast majority of our electrical engineering students.

It would be an excellent project for Electrical World to gather some reliable information on the subject of young engineers' employment in the electric power industry. I would like to see several articles on this subject which I am sure will be enlightening to both the industry itself as well as to students who are interested in this field.

Lawrence J. Hollander
Assistant to the Dean
College of Engineering
New York University

▶ We are grateful to Reader Hollander for his views on a subect which is of vital interest to the electric utility industry. Electrical World has every intention of looking more thoroughly into this area, both to determine the need for engineers and to determine how these needs are being met.

IMPORTANT COST REDUCTION IN TRANSMISSION LINE CONSTRUCTION



Build this 69 kv transmission line with only 7 bolts per structure

Here is a line design that reduces the labor component of construction cost. Good news for builders that find labor factors higher and higher!

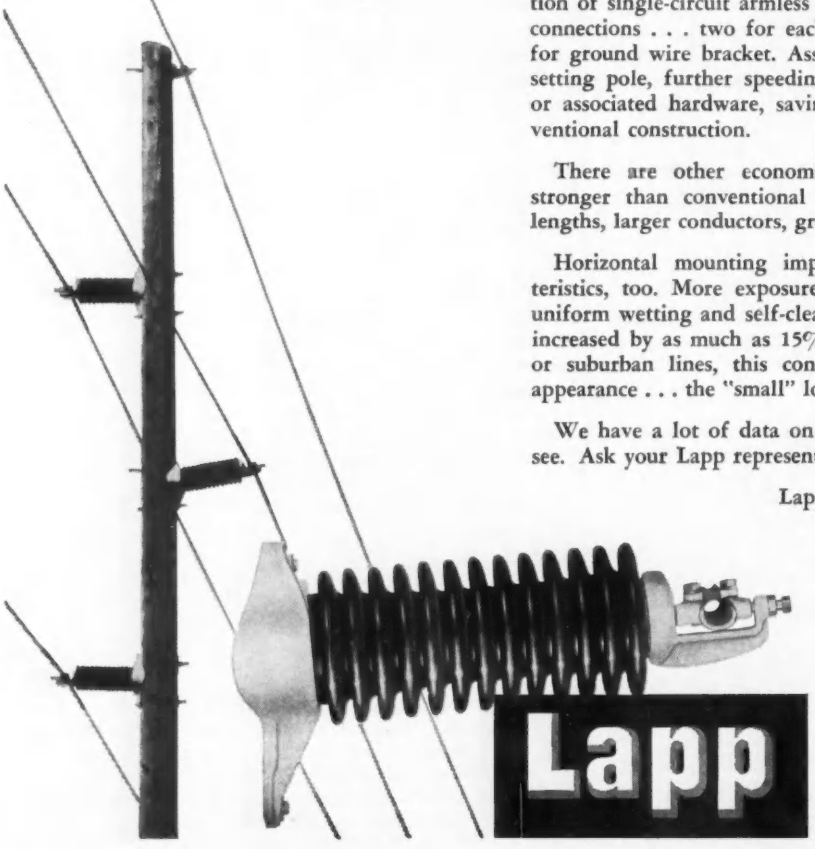
Use of horizontally-mounted Lapp Line Posts permits erection of single-circuit armless structures, with only seven bolted connections . . . two for each integral-gain-base insulator, one for ground wire bracket. Assembly is done before raising and setting pole, further speeding erection. Without arms, braces, or associated hardware, savings are an actual 25% over conventional construction.

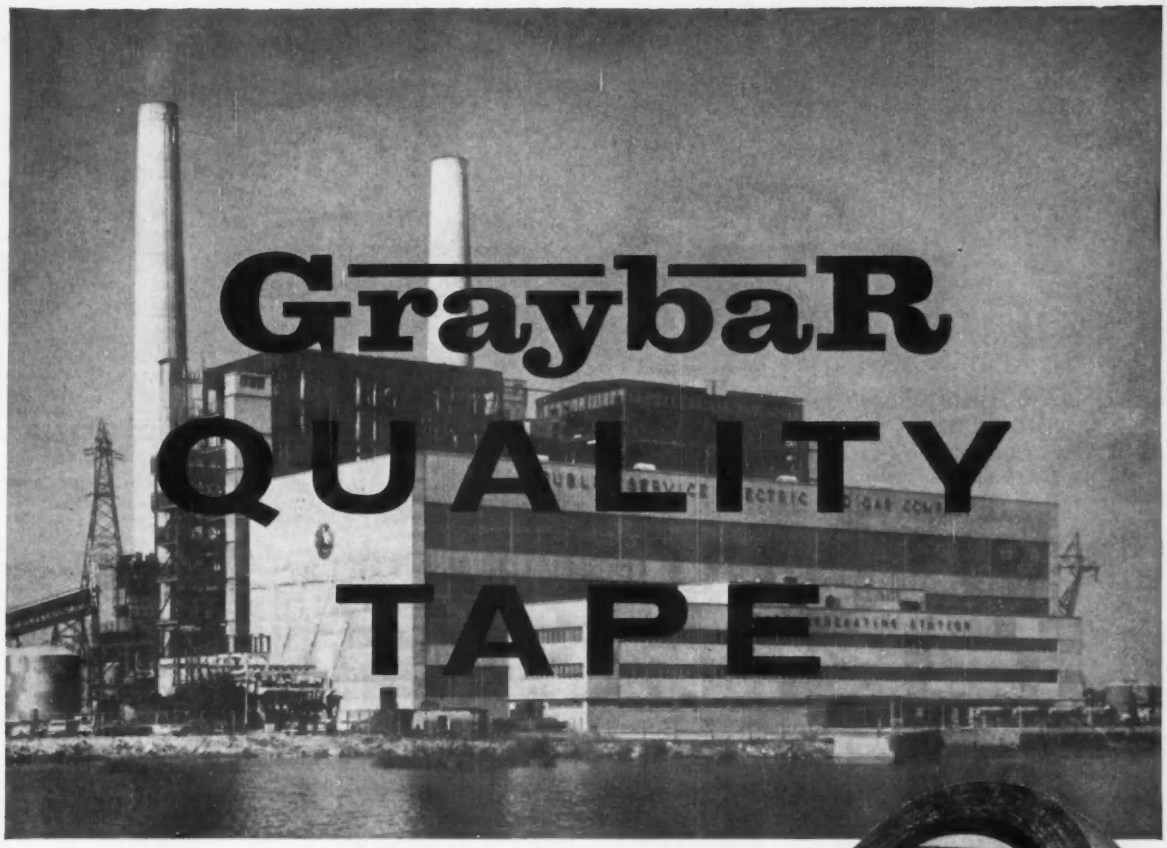
There are other economies also. Armless structures are stronger than conventional designs, permitting greater span lengths, larger conductors, greater factors of safety.

Horizontal mounting improves insulator electrical characteristics, too. More exposure of insulator surfaces encourages uniform wetting and self-cleaning . . . wet flashover values are increased by as much as 15% over upright ratings. For urban or suburban lines, this construction offers trim, unobtrusive appearance . . . the "small" look of a distribution line.

We have a lot of data on this construction that you should see. Ask your Lapp representative or write:

Lapp Insulator Co., Inc., Le Roy, N. Y.





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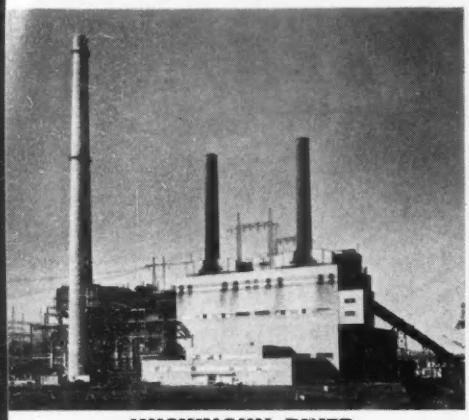
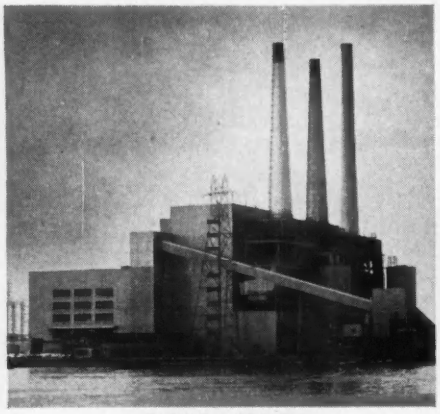
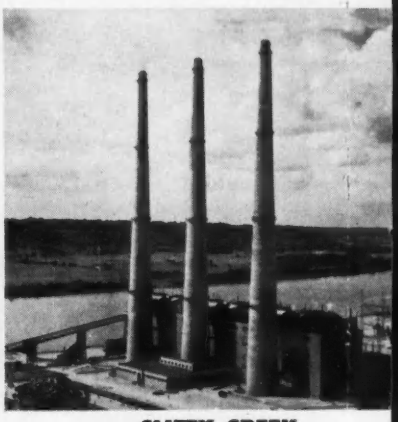


MUSKINGUM RIVER
9161 Btu/kwhr Ohio Power Co.
on the American Electric Power System
Two B&W Pressure-Fired Open-Pass Boilers and two Pressure-Fired Radiant Boilers



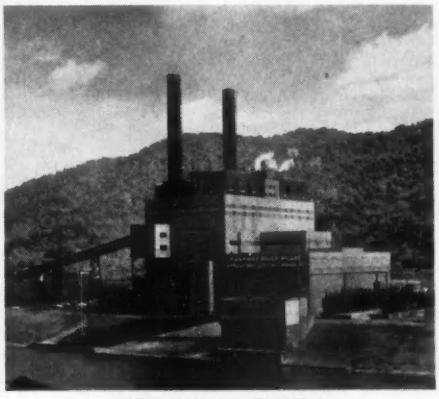
RIVER ROUGE
9160 Btu/kwhr
Detroit Edison Co.
One B&W Radiant Boiler
Firing 10% Blast Furnace Gas and 90% Coal



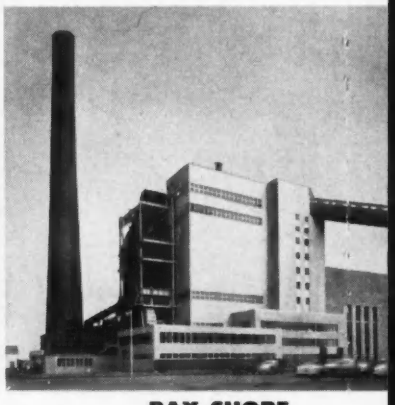
CLIFTY CREEK
9130 Btu/kwhr
Indiana-Kentucky Electric Corporation*
Six B&W Pressure-Fired Open-Pass Boilers

ALLEN
9178 Btu/kwhr
Duke Power Co.

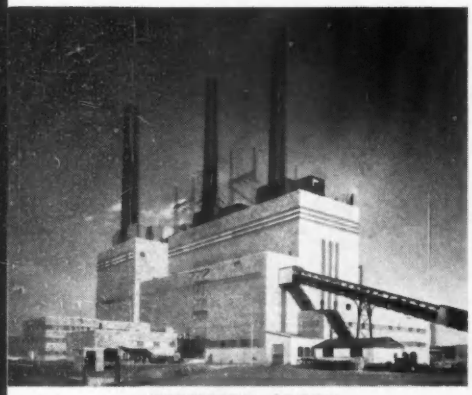
McMEEKIN
9093 Btu/kwhr
Part year, more than 6 months
South Carolina Electric and Gas Co.



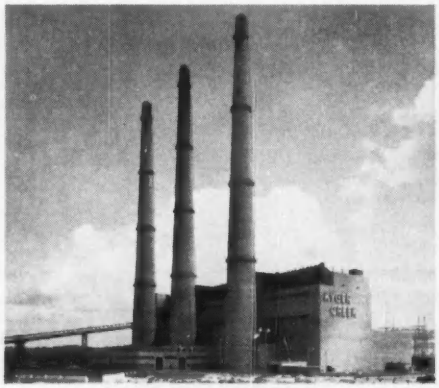
KANAWHA RIVER
9143 Btu/kwhr
Appalachian Power Co.
on the American Electric Power System
Two B&W Pressure-Fired Radiant Boilers



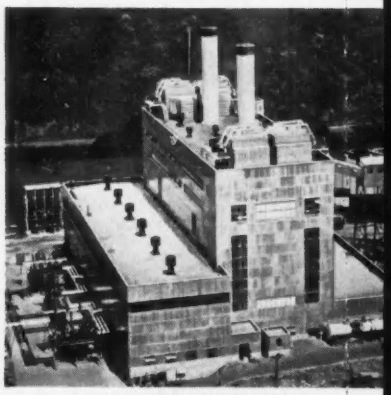
BAY SHORE
9233 Btu/kwhr
Toledo Edison Co.
One B&W Radiant Boiler



TANNERS CREEK
9209 Btu/kwhr
Indiana & Michigan Electric Co.
on the American Electric Power System
Three B&W Pressure-Fired Radiant Boilers



KYGER CREEK
9166 Btu/kwhr
Ohio Valley Electric Corporation*
Five B&W Pressure-Fired Open-Pass Boilers



SHAWVILLE
9163 Btu/kwhr
Pennsylvania Electric Co.
Two B&W Radiant Boilers

FOR FIFTH CONSECUTIVE YEAR

B&W's Engineering Leadership Proved in Nation's Most Efficient Power Plants

It's the same story, year after year; most of the stations reported "best heat rate stations" by the Federal Power Commission are equipped with B&W Steam Generators. In the past five years . . .

1958 — 8 out of 10 "most efficient"
1957 — 8 out of 10 "most efficient"
1956 — 9 out of 10 "most efficient"
1955 — 7 out of 10 "most efficient"
1954 — 7 out of 10 "most efficient"

The "why" of this leadership is a pace setting research and development program that has given the power industry such innovations as gas tempering, the Universal Pressure Boiler, pressure firing, the Cyclone Furnace, and the Cyclone Steam Separator that makes natural circulation practicable in the highest pressure subcritical boilers.

B&W works closely with the Electric Utility industry helping to meet, often anticipating, their needs. In this way electric utilities and their suppliers can continue to fulfill their vital role in American growth. The Babcock & Wilcox Company, Boiler Division, Barberton, Ohio.

B&W

THE BABCOCK & WILCOX COMPANY

BOILER DIVISION

G-959-CS

***Ohio Valley Electric Corporation and its subsidiary, Indiana-Kentucky Electric Corporation, sponsored by these companies:**

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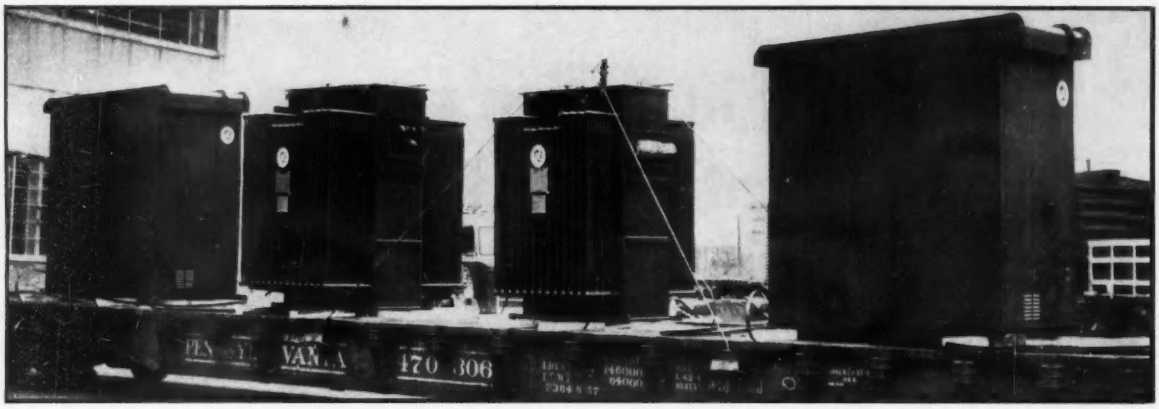
(a) Subsidiary of American Electric Power Co. (b) Subsidiary of The West Penn Electric Co. (c) Subsidiary of Ohio Edison Co.

Pennsylvania Transformer Announces a Complete Line of SECONDARY

All Components Designed and Manufactured Under One Roof

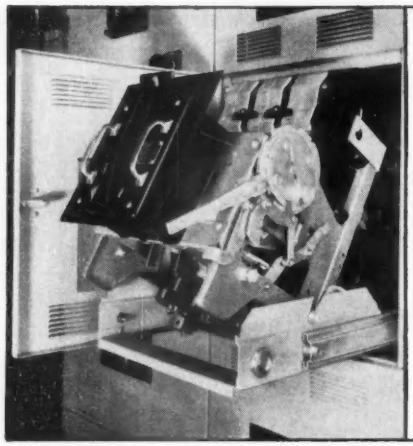


Coordinated shipment of all substation components is the practice at Pennsylvania Transformer. Switchgear assemblies and transformers are produced at the same plant.

Tilt-back Feature Facilitates Inspection and Maintenance

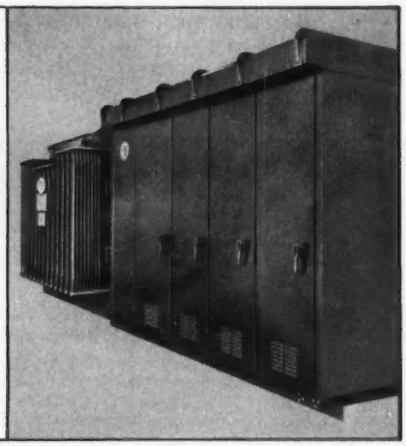
A unique feature of Pennsylvania's drawout switchgear allows the breaker to be tilted back when in the withdrawn position. This is particularly important for maintenance and the adjustment of trip elements.

The racking mechanism is operated with a self-storing captive handle. Before it can be operated, the mechanism must be unlatched with a lever that can be moved only with the breaker open. The mechanism locks in all positions. The compartment door can be closed with the breaker in any position.



◀ Breaker shown in withdrawn and tilted back position for easy access to trip units.

Outdoor articulated Pennsylvania substation with oil-filled transformer. Substation is rated 1500 kva, 12,470-480Y/277 volts. ▶



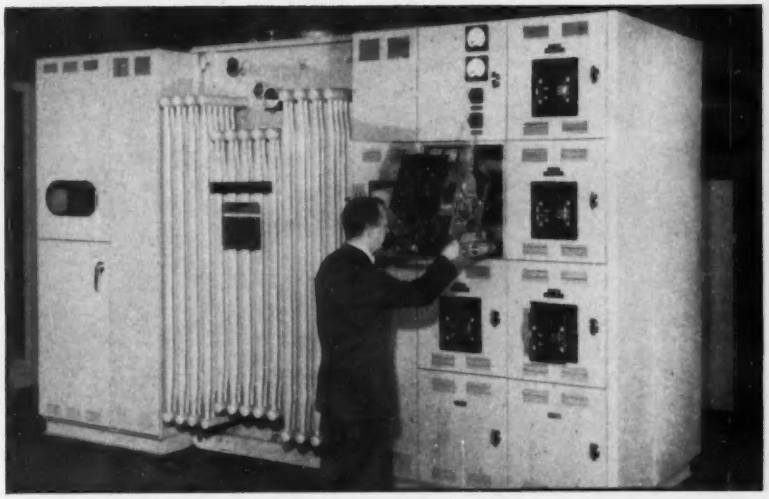
McGRAW EDISON

PENNSYLVANIA

Designed and manufactured by Pennsylvania Transformer

UNIT SUBSTATIONS

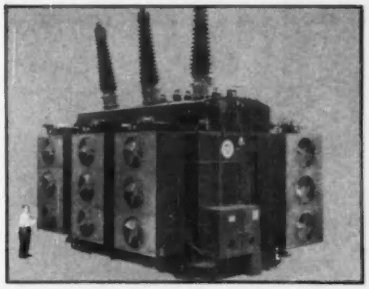
- **Centralized Responsibility Assures Coordinated Shipment of Components, Easier Installation.**
- **Products Include Indoor and Outdoor Substations —Articulated and Integrated.**
- **All Substation Components Designed in a Separate, New Department, by an Experienced Staff of Switchgear and Transformer Engineers.**
- **Low Voltage Switchgear Manufactured in New Facilities Adjacent to Transformer Plant.**
- **Pennsylvania Assumes Complete Responsibility For Materials, Workmanship and Operation of Complete Unit Substations. Perfect Fit and Matching Appearance of Components Guaranteed.**



Pennsylvania Transformer's new line of secondary unit substations includes both indoor and outdoor designs. Pictured is a 1000-kva articulated, indoor substation rated 4160-480Y/277 volts. The substation includes a primary, fused, air-interrupter switch, an askarel-filled transformer, and secondary drawout switchgear with a feature that allows the breaker to be tilted back for inspection and maintenance.

Pennsylvania... Builder of Load Center Transformers for Many Years

Pennsylvania Transformer enters the secondary unit substation field with a background of over 30 years' experience in designing and building distribution, power and load center transformers for America's leading utilities and industrials.



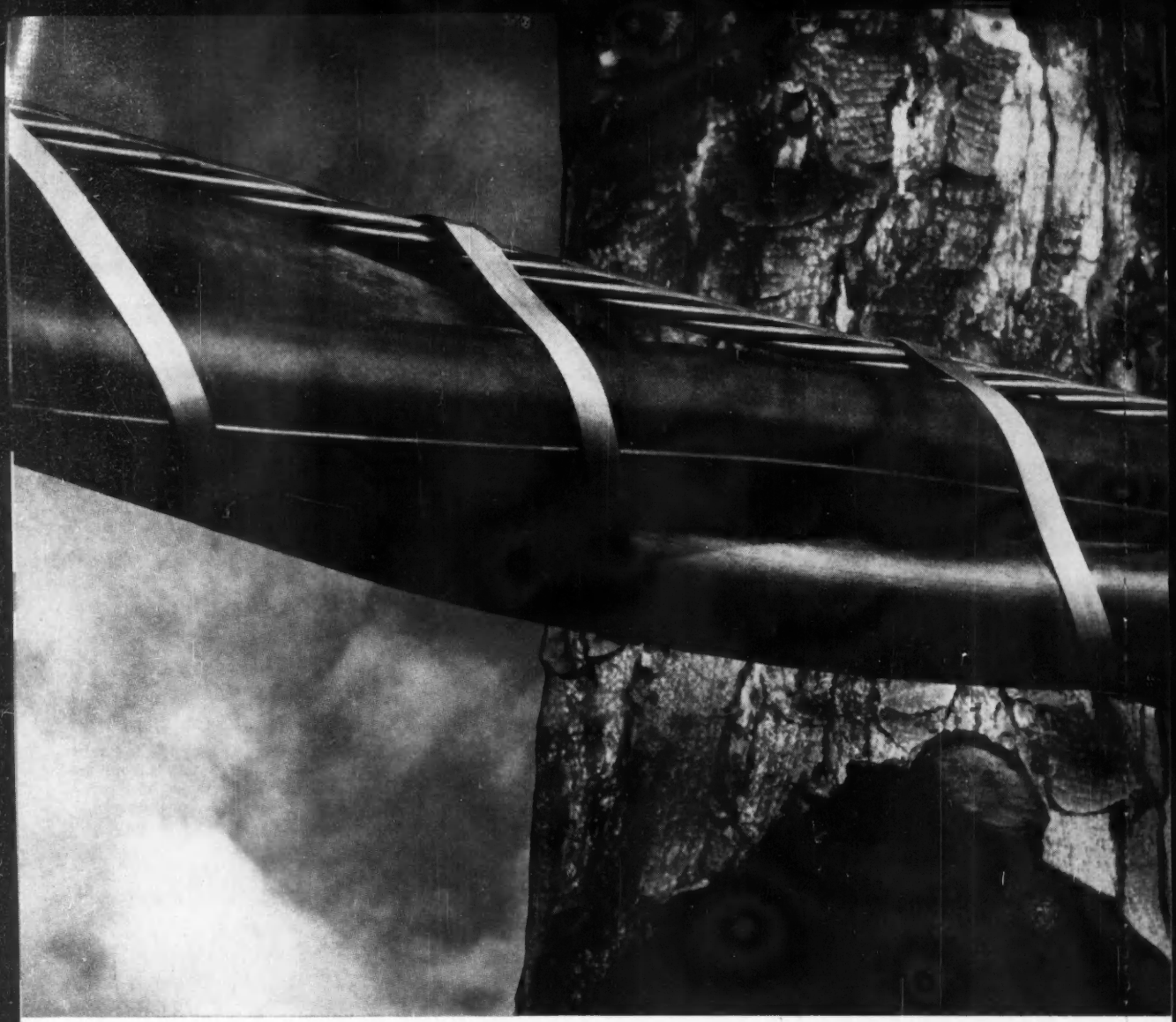
315,000-KVA
power transformer manufactured by Pennsylvania Transformer Division for a large midwestern utility.

Write for Copy of Pennsylvania's Secondary Unit Substation Book

This well-illustrated 44-page booklet, No. PSG 559, contains descriptions of secondary unit substation and switchgear components, as well as application data. Write for a copy on your company letterhead.

UNIT SUBSTATIONS

Division, McGraw-Edison Company, Canonsburg, Pa., Greater Pittsburgh District



Blaze a smaller path!

Running a power line through a dense tree area can be a costly job!

With open-wire systems, the path you clear must be a broad one. Otherwise extra-long poles are necessary. Either way costs you plenty.

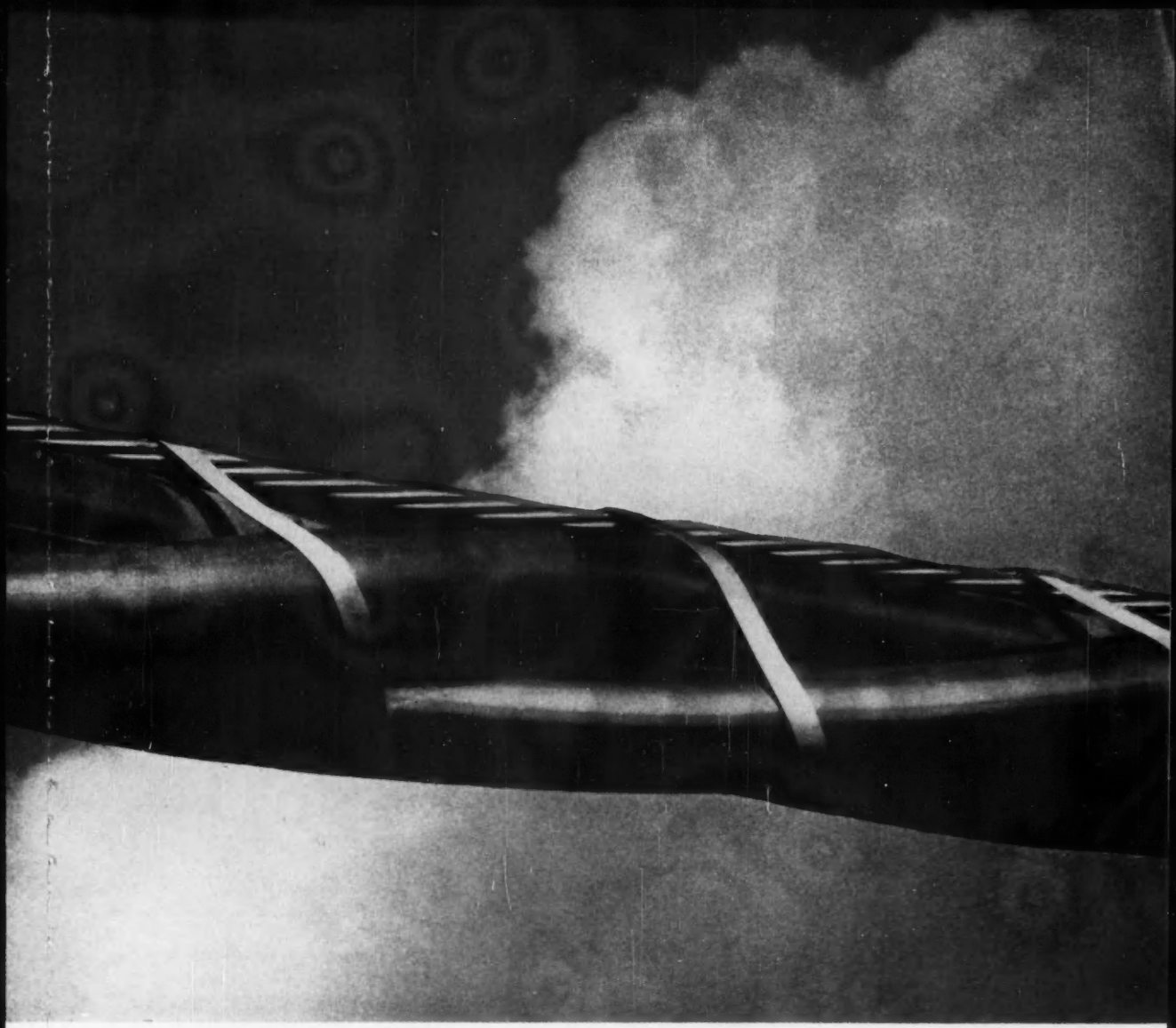
With Rome's reverse-lay preassembled aerial power cable, less tree clearance is required, so you do less tree trimming—initially *and* periodically. Rome aerial cable has a built-in, high-strength messenger for staunch support—capable of supporting falling branches and even trees.

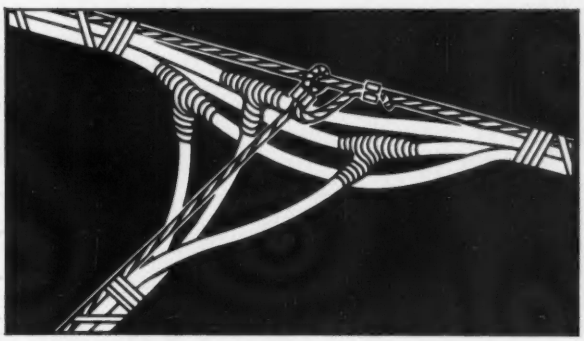
For instance—you need not clear as much of a right of way *initially* as you would for open-wire systems. And you can put off *periodic* tree trimming for as long as five years, compared to the normal two-year requirement for open-wire systems.

Because each conductor is fully insulated and jacketed for maximum resistance to moisture and tree abrasion, reverse-lay aerial cable reduces the chance of outages during storms and high winds. There's no chance that wet branches will cause shorting between phases. And it's safer for your line crews to handle during storms . . . safer for the public too!

In residential areas, preassembled aerial cable gives you two *more* advantages. You avoid situations in which the public might feel you are "defacing" property by excessive tree trimming. And, because it's compact, aerial cable makes a neat, uncluttered appearance—less likely to bring complaints.

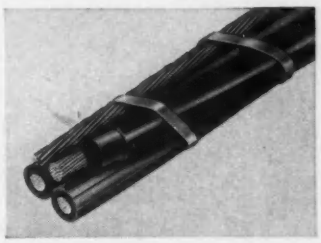
You can get Rome's preassembled reverse-lay aerial power cable in a wide range of constructions, rated up to 15 KV: Rozone (oil-base) or Rozone A (butyl-base) insulation, Roprene (polychloroprene) or Roseal (flame-retardant polyethylene) jacketing. Mail the coupon, now!





EASE OF TAPPING Long spans sometimes make mid-span tapping necessary. Rome's reverse-lay preassembled aerial cable construction—where the direction of lay of conductors is reversed at regular intervals along the line—permits easy mid-span tapping. The reversed portions provide sufficient "slack" for taps *anywhere* along the line! This eliminates the necessity of making taps at the pole ends only. Stress is carried entirely on the messenger. Conductors can be untwisted for tapping without cutting—even while the line is hot! Your linemen can use wire guards and rubber blankets for safety and make pole-end taps without use of a platform.

BETTER VOLTAGE REGULATION Because of its close geometric spacing as compared with open-wire circuits, aerial cable has a lower reactance. Voltage drop is about half as great as typical crossarm construction and, for a given voltage drop, power can be transmitted twice as far.



ROME CABLE
DIVISION OF ALCOA

Department 120, Rome, N. Y.

☐ Please send me more information on the above.

Name .....

Title .....

Company .....

Street .....

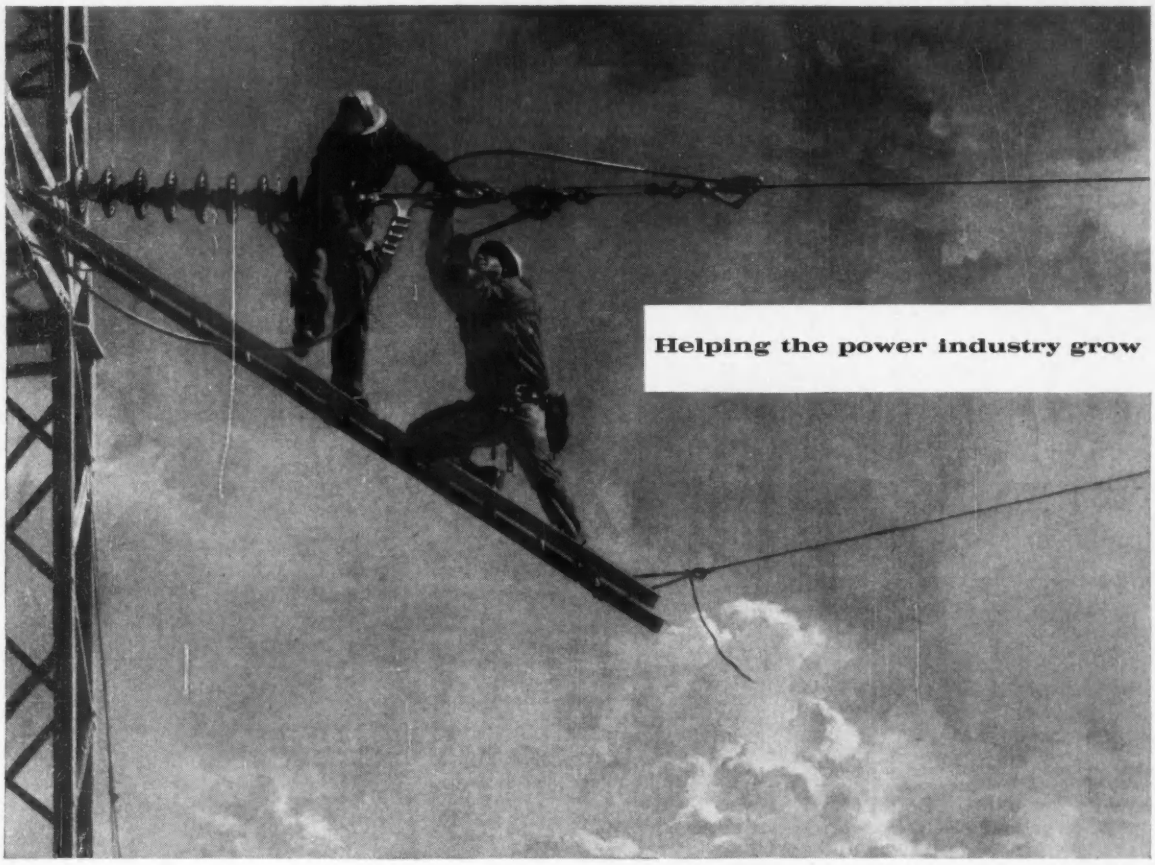
City ..... Zone ..... State .....

NATIONAL ELECTRICAL WEEK
FEB. 7-13, 1960

Aerial Teamwork

Working outside the frame of a high steel tower, sure-footed construction men string a powerline with the help of a come-along. Varied skills and long experience are prime factors to consider when selecting a firm to execute a power project. United Engineers has worked with many well-known utilities and industrial firms in designing and constructing hydroelectric and thermal plants, electric substations, and installations for supplying heating and process steam. Our skills and creativity can augment your engineering staff as required. We invite you to profit from our background of 75 years' experience as designers, construction engineers and engineering consultants.

Painting by Stanley Meltzoff



Helping the power industry grow

UNITED ENGINEERS

& Constructors Inc • U.E.&C. (Canada) Ltd. • New York • PHILADELPHIA • Chicago

No fumbling with loose parts

The O-B 88500 Universal clamp has no loose nuts, bolts, washers, or keeper piece for the lineman to worry about. The reason, of course, is that there is no need to remove these parts in the first place.

A special spring clip holds the clamp open while the lineman uses both hands to form and bend the conductor. Then the nuts are tightened on the U-bolts. The clamping job is completed. Installation can be done entirely from one side, with the line hot or dead.

Made of galvanized malleable iron, the 88500 takes the full range of conductors from .20 to .50 inches in diameter. The very design of these clamps give them inherent high holding strength.

It's easy to see how the O-B 88500 clamp simplifies the lineman's job and makes deadending convenient and efficient. Just the time saved in speedy installation could well help pay for the clamps. Why not try them on your next deadending job and see for yourself their many advantages?

OHIO BRASS COMPANY, MANSFIELD, OHIO

Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

10037-H

For UNDERGROUND
Wagner SUBURBAN
PAD MOUNTED TRANSFORMERS
Available in single-phase, 25-167 Kva;
three-phase, 75-500 Kva.

DISTRIBUTION...

WAGNER SUB URBAN TRANSFORMERS

are safe... well-ventilated ...adaptable to future load growth

Plotting a new subdivision? Planning a new shopping center? Reworking, modernizing a distribution system? Write Wagner Sub-Urban Pad Mounted Transformers into your standards.

Wagner Sub-Urban Pad Mounted Transformers are designed to be used wherever underground distribution is necessary or desirable. They are ideal for use in residential areas. Compact in size, low in profile, they can be hidden behind plantings of shrubbery.

Safe to use? Certainly. A padlocked, tamperproof enclosure protects your equipment... protects people. The public is protected from exposed hot-lines... and, your crews are protected, too, by a door over the primary compartment which lets them work on the secondary without danger from high voltage.

Sub-Urban Transformers are well-ventilated... they can be loaded to capacity. When load growth makes it necessary, larger transformers can be quickly and easily installed to replace the original transformer units. These transformers normally require only routine maintenance. Due to better protection, far fewer faults occur in an underground system over a period of time than would generally occur in a comparable overhead system.

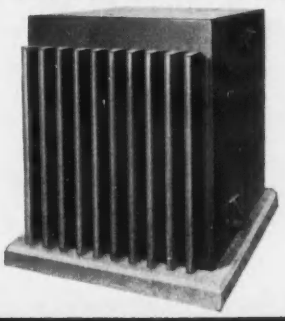
Get the whole story of Wagner Sub-Urban Transformers. Consult your nearby Wagner Sales Engineer, or write for Bulletin TU-148.

Wagner Electric Corporation

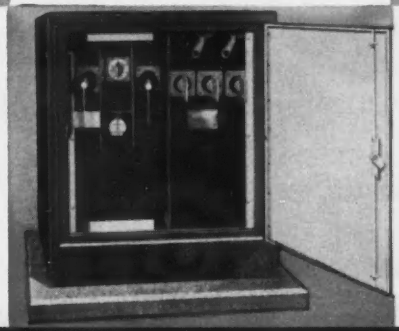
6456 PLYMOUTH AVE., ST. LOUIS 33, MISSOURI

WT60-4

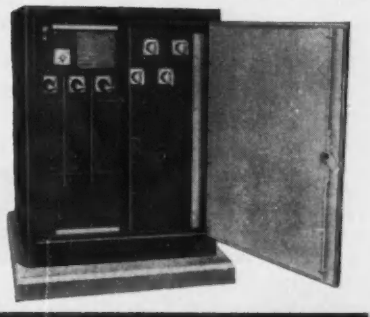
BUILT TO LAST—Tank is of heavy gauge sheet steel, with welded-on cover. Smoothly shaped radiators are welded to tank along their entire length. Complete special asphalt-type undercoating gives lasting protection against rust and corrosion.



SINGLE-PHASE—Terminal cabinet of a 100 Kva single-phase transformer. Barrier plates are provided between high voltage bushings and between high and low voltage compartments. Single-phase ratings from 25 through 167 Kva.

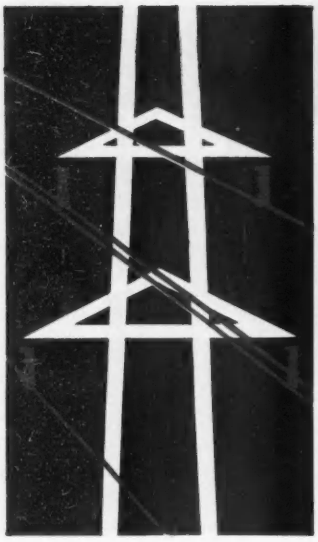


THREE-PHASE—Terminal cabinet of a 225 Kva three-phase Sub-Urban Transformer. High voltage tap changer is at the left side of the nameplate. Three-phase pad units are available in ratings from 75 through 500 Kva.



IBM 1620 *data processing system*

...the most powerful engineering computer in its low price class



In the Electric Utilities Industry the IBM 1620 solves problems like these:

- *systems planning and simulation*
- *load flow computation*
- *short circuit studies*
- *economic fuel purchase*

The new IBM 1620 is a desk-size engineering computer that offers you more computing ability per dollar than any system in its price class.

Transistorized throughout, the IBM 1620 has a 20,000-digit magnetic core memory with variable field length and immediate accessibility. Its input-output notation, on paper tape and console typewriter, is in convenient decimal arithmetic. It can perform more than 100,000 calculations a minute and is easily adapted to your engineering problems.

Easy to learn, easy to operate, easy to communicate with, the low-cost 1620 helps free your engineering talent for more creative work. And in keeping with our concept of Balanced Data Processing, the IBM 1620 is supported by extensive services. This includes a comprehensive library of mathematical routines and specific industry programs to permit you to put the 1620 to work without unnecessary delay.

Ask your IBM representative about the unique advantages of the IBM 1620. Like all IBM equipment, it may be purchased or leased.

IBM® *balanced data processing*

The Electrical Week

LATE NEWS ▶ **Savings of 10-15% on turbine generators and 7-8% on boilers** would be available if utility cyclical buying bugaboos were eliminated, the Public Utility Buyers Group was told at its Atlanta meeting last week. GE's W. S. Ginn urged utilities to buy large equipment on a growth-trend line, rather than in cycles.

The American public has been grossly oversold on A-power, according to former AEC Chairman David Lilienthal. He said there are still volumes of economic and safety problems to be solved before electricity can be produced commercially from the atom. He blames government secrecy and control for lag in A-power development.

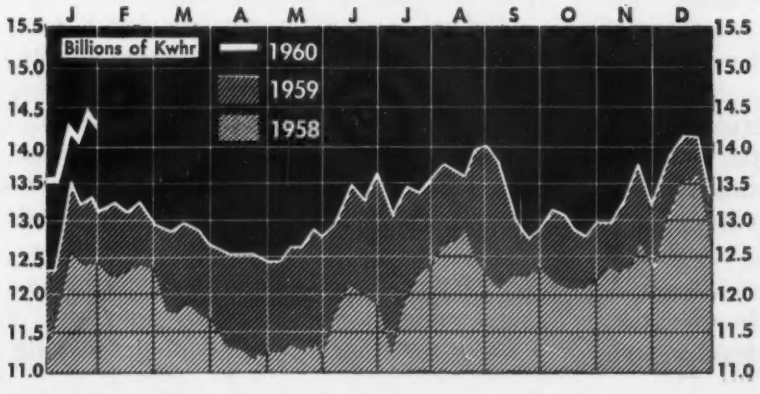
Justice Dept institutes grand jury probe in Milwaukee of the pricing policies of manufacturers of pole line hardware. Details are sketchy, but this probe is not connected with Philadelphia hearings.

Washington Wire . . . General Accounting Office hits Bureau of Reclamation's handling of Upper Colorado River Project . . . Sen Gale McGee (D-Wyo.) asks Interior Secy Seaton for assurance that preference users in Rocky Mountain area will have ample supply of energy.

Around the States . . . California PUC authorizes rate cuts for 21,166 PG&E electric customers amounting to $282,000 a year . . . Gov Brown hires Charles T. Main, Inc of Boston, Mass., for feasibility studies of California's Feather River project . . . Central Illinois Light asks for $2 million rate hike.

Management changes . . . GE names J. F. Young general manager, electric utility system engineering and planning in Electric Utility Group. He is succeeded as general engineering laboratory general manager by Dr J. H. Hollomon.

WEEKLY POWER OUTPUT—Up 8.8% (Week ending Jan. 30), Kwhr 14,313,000,000



Per Cent Change From Previous Year

	Jan. 16	Jan. 23	Jan. 30
Total U. S.	+ 6.8	+ 8.4	+ 8.8
New Eng.	+ 5.8	+ 5.0	+ 5.4
Mid. Atlan....	+ 7.8	+ 7.6	+ 6.5
Cent. Ind.	+ 8.4	+ 9.1	+ 9.1
West Cent. ...	+ 5.7	+ 4.4	+ 5.2
Southeast	— 1.1	+ 7.7	+11.1
South Cent. ...	+ 8.2	+ 8.1	+ 9.1
Rocky Mount ..	+ 9.2	+ 9.1	+11.3
Pacific			
NW	+11.3	+13.1	+ 8.6
SW	+18.4	+11.7	+10.2

Seasonally Adjusted Index 266.6

Week Ago 260.9 Year Ago 244.5

Source: Edison Electric Institute

Preview of This Issue

EVENTS ▶ **If Bonneville ties with California, two things are needed,** a Portland meeting decided. First, amend the BPA Act to limit sales outside present borders to surplus; second, a more extensive study **(p 32)** . . . U. S. power industry must attract good engineers or risk loss of its technical pre-eminence, Con Ed's C. E. Eble told general session of AIEE (p 34) . . . Despite some disenchantment with value of National Electrical Week promotions, over-all view finds NEW activities widening **(p 36)** . . . Public power partisans held the floor as hearings began on Sen Murray's resources bill **(p 37).**

ENGINEERING ▶ **Public Service of Indiana uses a new steel tower.** The rectangular steel structure, designed without the usual broken-conductor features, gives the company economies in a new 230-kv line tying New Albany Station to the system **(p 39)** . . . A 154-kv aerial transmission line will soon span the Bosporus Straits to join Turkish Asiatic power sources with European Istanbul **(p 43)** . . . A low-profile substation, the so-called Luzon design of 40-kv strain bus steel structures, affords Detroit Edison both savings and community acceptance **(p 45).**

PROCUREMENT & PRODUCTS ▶ **EEI reports upswing in power transformer and boiler orders . . .** Steel strike is causing some delays in turbine and generator deliveries

Politics and Public Power

STORM WARNING IN THE FAR WEST

A storm is brewing over the Pacific Gas & Electric Co's proposed 230-kv transmission line connection with Bonneville Power Administration to take surplus Bonneville power.

The things that go to make up the storm are political. They involve the Senate Interior Committee, and fall into two groups:

(1) Additional delays for committee approval; and

(2) Refusal to accept the results of a special study made by Bonneville at the Interior Committee's request. The refusal comes largely from federal power advocates.

The report—not due until Feb. 15—is being circulated for comment from interested parties and public agencies. It calls the PG&E line both economically feasible and desirable to Bonneville, and it points out that a larger capacity line between Bonneville and either PG&E or the federal Central Valley Project in California isn't justified.

The report took into consideration the comments from all interested parties and governmental bodies involved. It pretty well discounts the views of those—particularly Gov E. G. "Pat" Brown of California—who prefer the larger, federal line.

Federal power supporters are already preparing to fight this report when it is officially submitted to the committee. The American Public Power Assn says it will appeal directly to Sen James Murray (D-Mont.), committee chairman, to halt any agreement between Bonneville and PG&E until an additional study—favoring a federal line—can be completed and "additional legislation on purchase preferences" is passed by Congress.

The study to which APPA alludes is being

. . . Predict 1960 average domestic copper price of about 31¢ a lb (p 56) . . . Phelps Dodge ships 345-kv cable to Cornell University for field tests . . . IBM has new data system which is ten times faster than its 705 systems (p 58) . . . HV current transformer features ease and low cost in handling and installation . . . Pad-mounted transformers are designed for surface mounting (p 70) . . . Meter entrance for pole-top mounting provides 200-amp circuit-breaker entrance for use with underground secondary systems (p 71).

MANAGEMENT ▶ **Is a wiring bottleneck choking off your residential sales growth?** If so, then turn to page 63 to get the facts on what may be the hottest selling idea in the industry. Middle West Service Co's M. R. Rodger talks about the needs for and the benefits of "Correct and Capitalize"—the plan to capitalize service entrance equipment in order to correct the inadequate wiring bottleneck.

SELLING ▶ **Los Angeles Dept of Water & Power uses heat pumps in its offices.** The systems serve as models and are separately metered (p 72).

NEXT WEEK ▶ **Be sure to see the first Electric Utility Methods special section of** 1960. It will contain articles of interest to supervisors and foremen.

prepared for Gov Brown. Basically, it would include the same opinions that he gave to the Bonneville study group. But in this new report his views will be favorably advanced. It probably won't be finished for several months . . . which means, assuming Sen Murray concurs in APPA's request, that the committee will take no action for several months. At best, this can delay the building of the PG&E line; at worst, it can help kill it.

APPA, following a two-day session of its legislative committee in Washington—and immediately on the heels of the Electric Consumers Information Committee workshop (EW, Jan. 25, 1960, p65)—called the proposed Pacific G&E line "entirely inadequate to provide the full benefits which will result by coordinating the power producing facilities of both regions" (Both regions being the area served by Bonneville and California). APPA found that "a huge backbone extra-high-voltage transmission line is necessary to meet the growing West Coast problems. The line, the Association maintains, should be operated on a common carrier principle to transmit power generated by both federal agencies and nonfederal utilities.

So the storm warnings are up. Undoubtedly, winds blowing from other quarters in the Northwest will confuse the picture even more: There are those who are suspicious of any Bonneville tie to California on the grounds that it is not in the Northwest's best interests to ship out power generated there.

But whatever happens, political Sou'westers are being put on for what may be the toughest public-vs-private power fight in a long time. After all, the first section of a federal nationwide "backbone" grid—which is what the tie amounts to—hangs in the balance.

Executive Reader

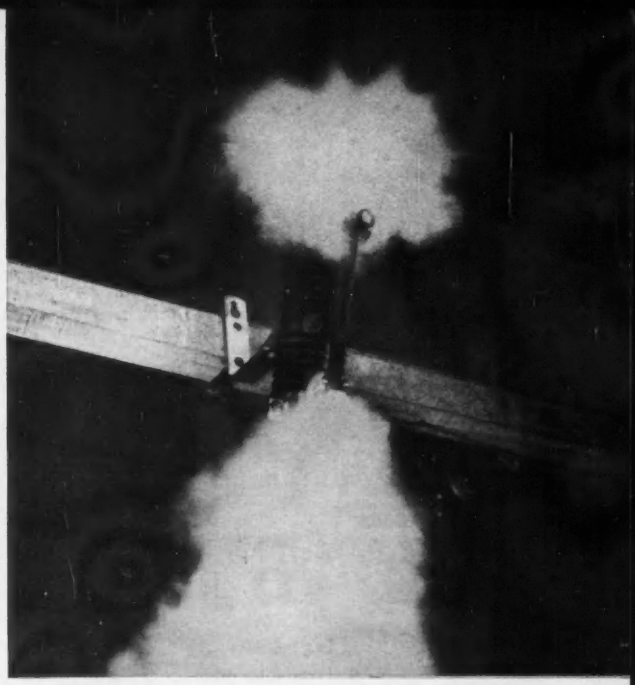
Pros and cons of public power are wrapped up in a look at the operations of the Electric Power Board of Chattanooga. The average residential consumer uses nearly 13,000 kwhr annually for about seven mills per kwhr. The Board performs a number of customer services, many free of charge. Advertising expenses exceed $6 per meter annually. The Board sets policies and rates not subject to the review of an impartial agency. Builders of "all-electric" developments receive service immediately; other builders face delays. Offers of fabulous "wiring allowances," guaranteed heating costs and free promotion are offered a prestige business that is considering using gas. The TVA payroll in Chattanooga may spell the difference between profit and loss for many local businessmen; the low electric rates make them forget their free enterprise American heritage. **Socialism and Crab Grass, Joseph R. Pahle, Chattanooga Gas Co, Public Utilities Fortnightly, February 4, 1960.**

A better look at space heating load should come from a study being concluded by about nine utilities under the sponsorship of the Northwest Electric Light & Power Assn. Hoping to decide whether space heating load, from the sales viewpoint, should be tolerated, actively promoted, or discouraged, the study will determine the demand of a representative customer at the time of system peak and maximum demand of the customer. At least ten single-family residences using electric heat primarily will be metered by each utility. **Electrical West, January 15, 1960.**

Inspection of standing wood poles is covered in detail in a report of the T&D Committee of EEI. Causes of wood pole failure, evaluation of the condition of the pole, procedure for adequate inspection, and methods of groundline treatment are some of the details spelled out. Typical record and report forms and an example of how to calculate pole strength in the field are included in the report prepared by the Timber Products Task Force, Standards and Specifications Subcommittee, T&D Committee. **Methods for Inspection of Standing Wood Poles in Overhead Lines, Publication No. 59-74, Edison Electric Institute, 750 Third Ave, New York 17, N. Y., $.50.**

Effect of creosote on polyvinylchloride sheathed cables is to swell the sheath and thereby change its electrical properties. Although no widespread troubles have been reported, there is sufficient evidence (some of it contradictory) to justify an investigation by the Cable Makers' Assn. Of the two basic types, "coke oven" creosote caused a greater swelling in tests than did "vertical retort" creosote. The CMA has not found any pvc compound which has an inherent immunity to creosote attack. **Distribution Of Electricity, No. 238, Vol. 32, January 1960.**

LINE MATERIAL concentrates all engineering, testing and manufacturing efforts in one direction—*highest quality equipment for the electric power industry.* And L-M came to you to find what you wanted in the best possible open type fuse cutout. The New LMO incorporates every important feature you asked for.



A 240,000 kva TEST on a 15 kv 100 ampere Type LMO Distribution Cutout at L-M's Thomas A. Edison Short Circuit Laboratory. This cutout repeatedly interrupts 16,000 ampere faults. Many tests like this prove the LMO cutout *Totally Tested* under all possible operating conditions.

This New Totally Tested Distribution Cutout Has All Features Electric Utilities Wanted

Drawing upon its more than 35 years experience in the engineering, testing and manufacture of distribution fuse cutouts, L-M has produced the new Type LMO open type fuse cutout.

Totally Tested in L-M's Thomas A. Edison Short Circuit Laboratory at Franksville, Wisconsin, with hundreds of tests, the new Type LMO has proved reliability, proved interrupting capacity and proved safety through its entire operating range.

The new Type LMO distribution fuse cutout has all the important features you asked for. Features heading the list:

1. Non-ferrous construction
2. Positive latching
3. High interrupting capacity
4. Rugged multiple contacts
5. Complete birdproofing
6. Choice of terminals—aluminum or bronze
7. Spring loaded interlocking flipper

Get Complete Information. Ask your Field Engineer to show you: the sample of the new Type LMO cutout; the Type LMO Bulletin No. FC3; the Type LMO Movie. Contact your L-M Field Engineer or write Line Material Industries, Milwaukee 1, Wis. In Canada: CLM Industries, McGraw-Edison (Canada) Ltd., Toronto 13, Can.

TYPE LMO RATINGS

VOLTAGE RATING KV	CURRENT RATING AMPS	INTERRUPTING CAPACITY AMPERES—ASYMMETRICAL			
		HEAVY-DUTY		EXTRA-HEAVY-DUTY	
		Non-Expendable Cap	Expendable Cap	Non-Expendable Cap	Expendable Cap
7.8	100	5000	10000	10000	20000
15	100	4000	8000	8000	16000
27	100	3000	6000	—	—

Interchangeable Fuseholders: ratings may be changed simply by changing the fuseholder. Choice of heavy-duty or extra-heavy-duty fuseholders; 200-ampere disconnecting blade; link-break fuseholder. This interchangeability offers convenience and savings in labor, material, and stocking costs.

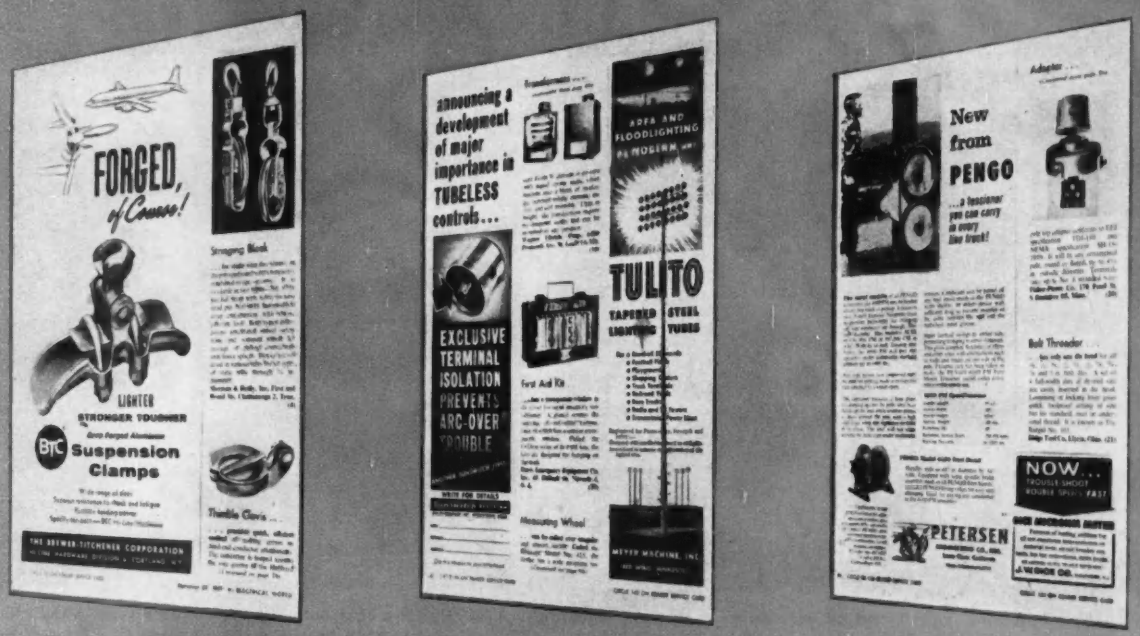
LINE MATERIAL Industries

McGRAW-EDISON COMPANY

SPECIALISTS IN DISTRIBUTION EQUIPMENT

434

DISTRIBUTION TRANSFORMERS • RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE & CONDUIT



Typical pages from World's "Electric Utility Methods" sections show how medium- and small-space advertisers tie their sales messages smoothly, effectively into "Methods" editorial content, to make an interesting package of helpful reading for utility men who work with construction-operations-maintenance equipment.

Electrical World's "Electric Utility Methods" issues offer whopping values for low-budget ad campaigns

MEASURE, CUT AND REWIND your own wire and cable
YOU CAN GIVE BETTER SERVICE CONTINUITY WITH
DURABLE
WESTINGHOUSE 1¼-STEP REGULATORS
Westinghouse

Electrical World's "Methods" sections are editorially planned for the engineers, supervisors, and technicians responsible for construction-operations-maintenance. Feature articles and "how-to" pieces, new equipment reports, test procedures, stores items, safety articles — all slanted to the needs of the man in C-O-M work.

As is standard in Electrical World, all pages are perforated for easy removal. Reader service cards covering ads and new product items make reader response easy. Completed report forms are forwarded to manufacturers at intervals as received. Over 90% of all advertisers have received reader requests for more information.

Electrical World's "Methods" sections offer every-issue frequency on a 6X schedule . . . put your ads close to "work-book" editorial

Much of the life and vigor in our electric power industry comes from the smaller- and medium-size companies, and the new ideas and services they offer. Through World's "Methods" issues these companies can run *solid, every-issue* programs of effective sales communications . . . *and economically!*

Electrical World will publish six "Methods" issues during the current year on the following dates:

February 15	August 29
April 25	October 24
June 27	December 19

Each Electrical World "Methods" issue includes a separate section devoted exclusively to new ideas and products in construction, operations, maintenance, and safety – separate from regular World content.

As a result, each "Methods" issue will have peak interest for the engineers, operators, supervisors, and technicians who "run" America's electric utilities – the same men who buy and use your equipment and supplies. As a regular "Methods" advertiser you will have two important advantages:

1. Your sales message will appear close to associated editorial – to be read while your prospect is thinking in terms of his job needs, and your product.
2. With 6 insertions your product story will appear in every "Methods" issue in '60, with visibility, for 60% of advertisers use only fractional space.

So, big budget or small, you *can* afford a regular schedule in "Electric Utility Methods" issues of Electrical World where you'll get *more* buying readers, a more *concentrated* audience. Your World representative can help in planning your 1960 "Methods" program.

The electrical industry's weekly magazine

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Covers the electric power industry completely

in service to advertisers
service to the industry
reader preference
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WIN A HAWAIIAN HOLIDAY

in the **HOTPOINT**
MEDALLION HOME PROGRAM

MEDALLION HOME ® LIVE BETTER ELECTRICALLY

A fun-filled trip to America's Paradise in the Pacific awaits power supplier representatives in the Hotpoint Medallion Home Program. This dynamic advertising and merchandising program is power-packed to help you turn more builders into Medallion Home builders.

Hotpoint backs up this tremendous load-building program with the quality appliances the public prefers plus . . . . 1960's greatest boost to all-electric living . . .

NEW
HOTPOINT ELECTRIC BASEBOARD HEATING
WITH CALROD® HEATING UNITS

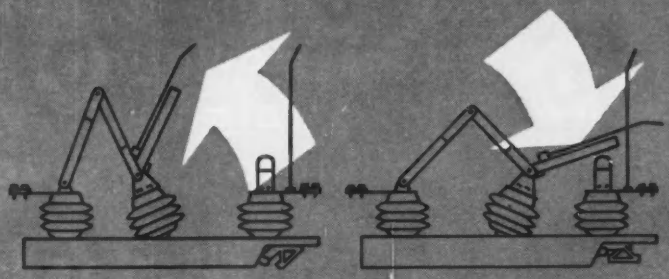
Hotpoint offers the load-building benefits of electric heating – clean, safe, comfortable, convenient, economical – plus the proven performance of famous Calrod heating units. Call your Hotpoint distributor today for complete details on new Electric Baseboard Heating, the Hotpoint Medallion Home Program, and your Hawaiian Holiday.

Hotpoint

A Division of General Electric Company, Chicago 44, Illinois

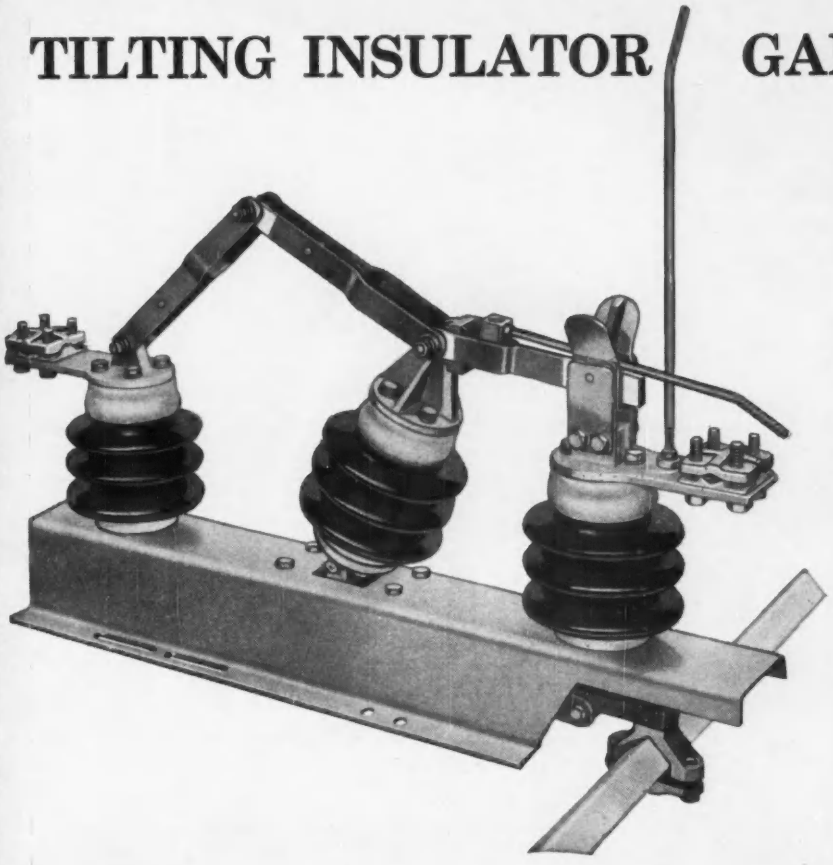
ELECTRIC RANGES • REFRIGERATORS • AUTOMATIC WASHERS • CLOTHES DRYERS • CUSTOMLINE® • DISHWASHERS
DISPOSALLS® • WATER HEATERS • FOOD FREEZERS • AIR CONDITIONERS • ELECTRIC BASEBOARD HEATING

Special **KEARNEY** design for

smooth opening  and closing

despite crossarm warpage

TILTING INSULATOR GANG SWITCH



- Switch works smoothly even when crossarms are warped out of alignment, horizontally or vertically, because the specially designed interphase shaft clamp compensates for any structural distortion
- Double leverage frees switch blade of heavy ice coatings: "pry-out" blade action plus toggle action of operating linkage on the tilting insulator
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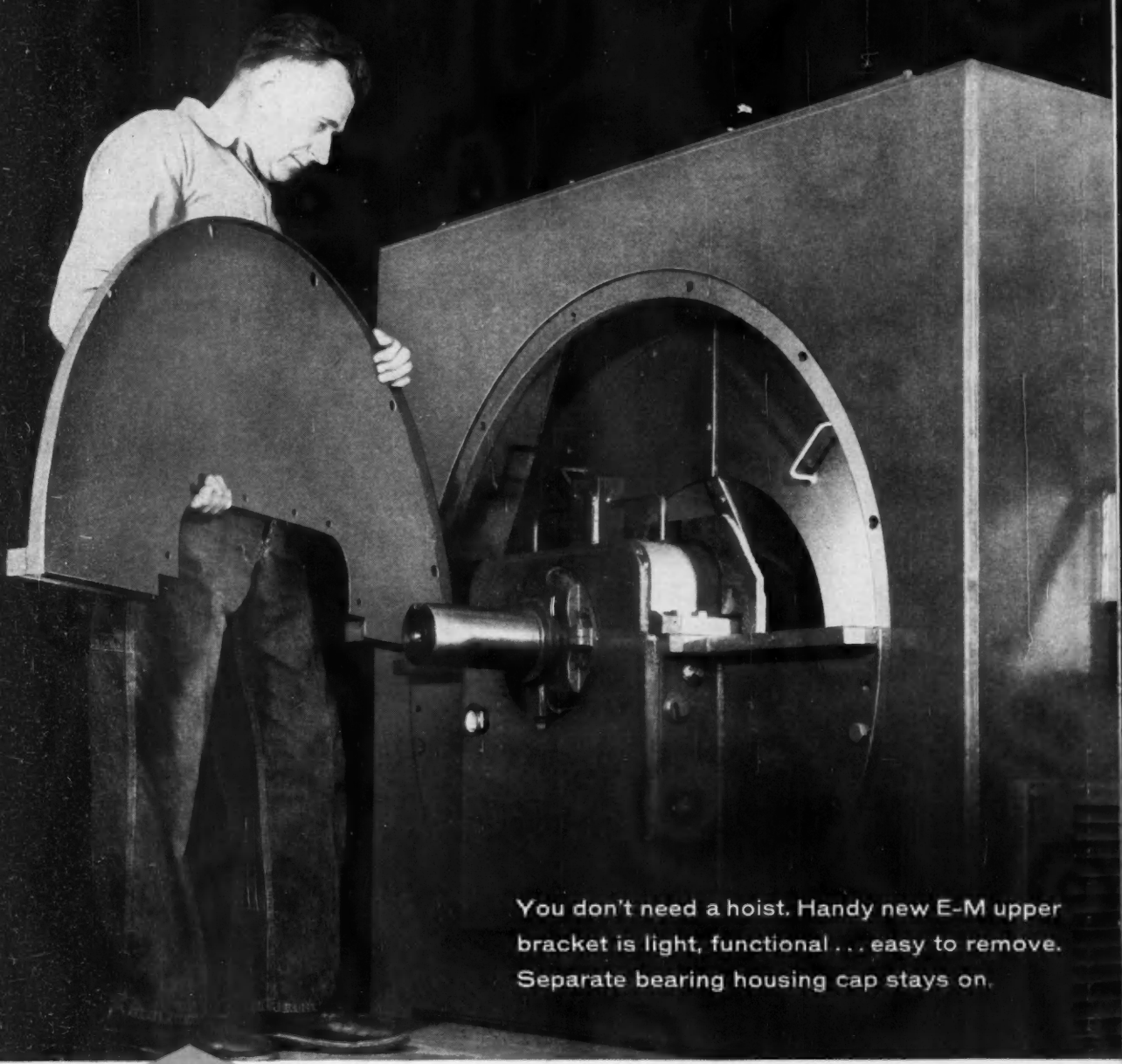

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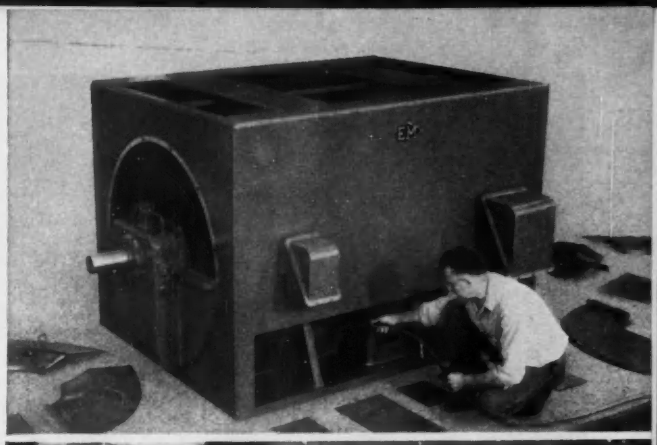
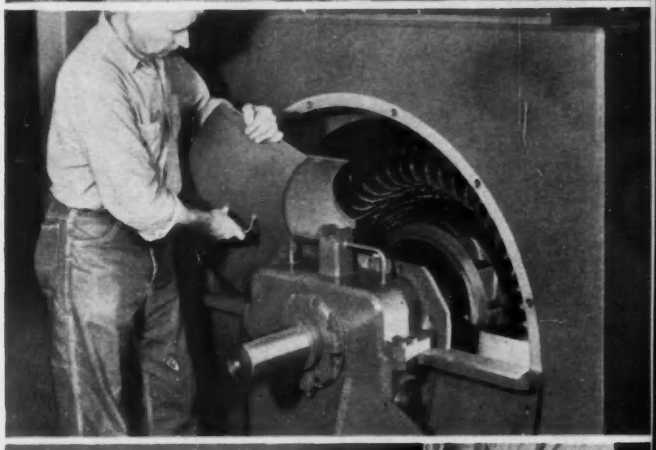
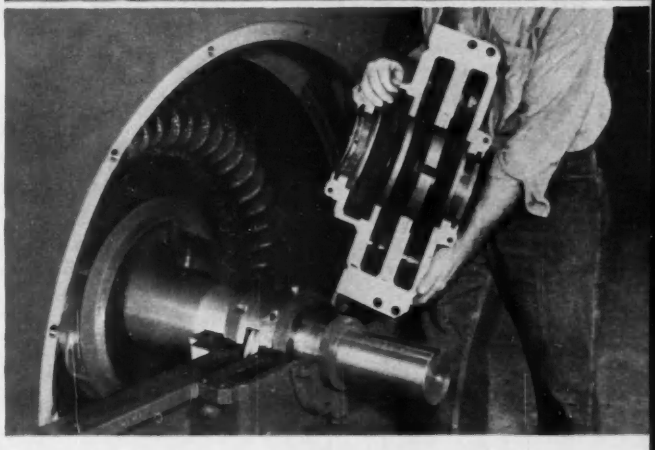


Coils are readily checked for condition and cleanliness. Four-section air baffle comes out easily without taking off lower bearing bracket.



Just lift the cap to inspect bearings. Raise the rotor shaft to roll out the lower bearing half.



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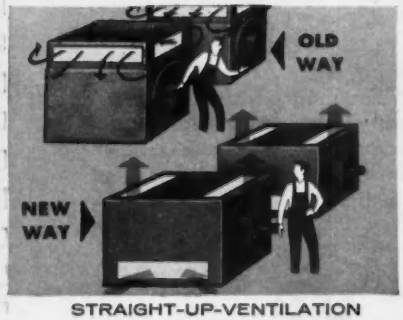
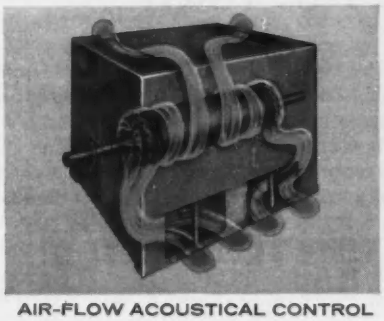
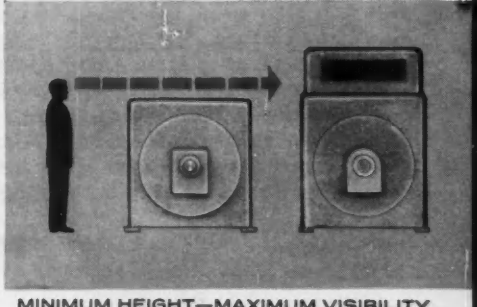


STRAIGHT-UP-VENTILATION



AIR-FLOW ACOUSTICAL CONTROL



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Editorial Comment

FEBRUARY 8, 1960

The True Race With the Soviets

Influential people, some in private enterprise, seem to have conceded the reality of a power race with the Russians. And when enough people believe in the reality of such an intangible, it really does exist.

Depending on your motives, you can use numbers to prove whether the U. S. is losing or winning. We don't deny the fascination generated by the numbers games. But we object strongly when someone uses them to force nonsensical changes in expansion patterns.

When public power adherents use the premise that the race is being lost to demand crash construction of huge blocks of public hydro, we insist that they've lost sight of the *true* race.

And there *is* a true race—a race between the USSR and U.S. economies. Without question, the Soviets have set out to surpass the U. S. economically. If the U. S. blunders in this economic war, it can be weakened to the point of surrender to the opposing ideology.

But it is time to pull the power race thinking back into perspective. Power is only a tool—a means to an end. The economic race cannot be won without adequate power, but the pattern of power expansion is much less important than whether power inadequacy can slow the economy.

In a large sense, the power race is meaningless unless translated into overall economic terms. Hydro numbers must not be pitted against hydro, steam against steam, or kv against kv.

All that counts is that power to propel the economy is there when needed. And we don't see that crash hydro programs are really important in this context.

Mistaken Identity Again

Once again we're impressed by the fact that too many people don't know whether a particular utility is private or public. This lack of information is unfortunate in customers and downright frustrating when found in the supposedly knowledgeable press.

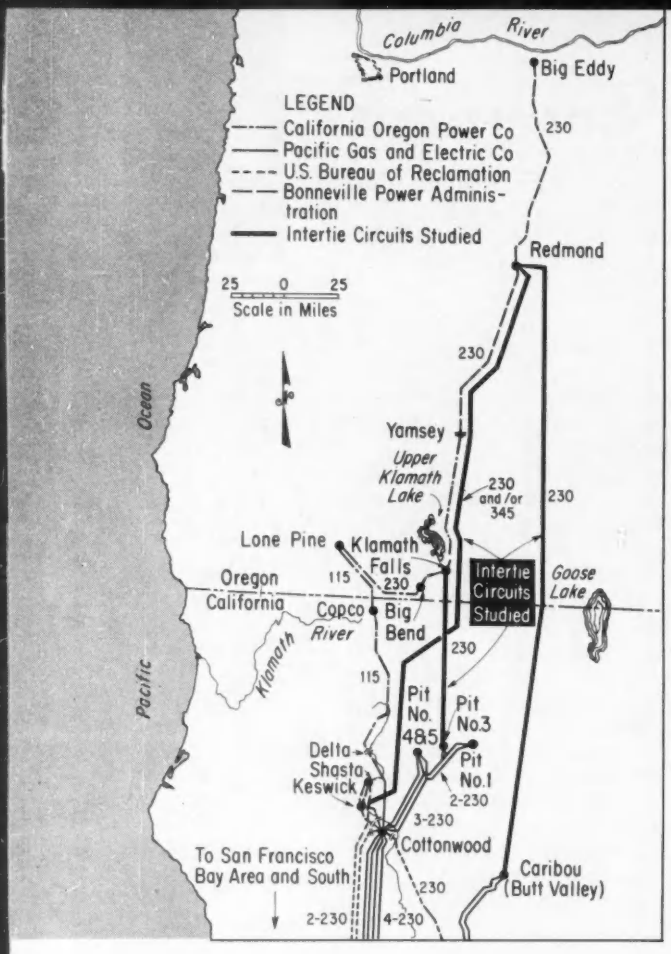
The case in point is a news item about the investor-owned New York State Electric & Gas Corp, which serves nearly a half-million electric meters. The bull appeared in the good gray New York Times. In a brief report on an electrical outage, the Times managed to drop "New York" and knock down the "S" in "State" to lower case. Thus: "A spokesman for the state Electric and Gas Corporation. . . ."

Now the state of New York is indeed in the power business, but so far, providentially, most certainly *not* in the business of serving residential customers.

Like most utilities with state names in their titles, this one suffers from frequent mistaken identity. We're sure its public relations group spends considerable time indoctrinating customers and local media. Admittedly, it's more difficult to keep wire services and out-of-town papers so informed.

Yet the general public's widespread and mistaken belief that the government is much more in the power business than is the case, works hard against those fighting to keep government power from spreading.

A suggestion: Each private utility press representative should make it a point to ensure that all his news media contacts know the facts, not only on his own company, but on all those over a large area centering on his utility. Such a cooperative effort, by overlapping and reiteration, could cut the problem down to smaller size.



These Transmission Plans Were Studied

Plan	Capacity-Mw	Additional Facilities Required
I	160	A 230-kv Klamath Falls-Pit No. 3 circuit.
II	200	A 230-kv circuit from Klamath Falls to Pit No. 3 and a share of transmission circuits in California for additional facilities that will be required with the Pit-McCloud and Trinity plants.
III	350	A 345-kv circuit from Redmond to Cottonwood and a share of additional transmission circuits in California which will be required with Pit-McCloud and Trinity generating plants. Allocation to the Pacific Northwest-California tie is one-half the costs of a double circuit 230-kv circuit from Cottonwood to the Bay Area.
IV	320	Two 230-kv circuits. First—Klamath Falls to Pit No. 3. Second—Redmond to Butt Valley.
V	360	Two 230-kv circuits. First—Klamath Falls to Pit. No. 3. Second—Redmond to Butt Valley. Includes allocated transmission costs as in Plan II.
VI	510	A 230-kv and 345-kv circuit. A 230-kv Klamath Falls-Pit No. 3 circuit, 345 kv from Redmond to Cottonwood double circuit 230 kv from Cottonwood to the Bay Area, and 230 kv from Big Eddy to Redmond.

Further Study

Bonneville's study shows 230-kv link to Pacific G&E plant would be economically feasible; agencies ask for more extensive data

The Bonneville Power Administration study of a high-voltage tie between the Pacific Northwest and California goes to the Senate Committee on Interior and Insular Affairs this month. The study favors the 230-kv interconnection proposed by Pacific Gas & Electric Co and BPA a year ago.

Political overtones and the old fear in the Pacific Northwest that California will work out a way to drain away the Columbia River's power make the PG&E link far from clearcut and simple. Echoes of these issues sounded in the comments of the utility and governmental groups which consulted with BPA in preparation of the study when they met in the Interior Building in Portland Jan. 25.

Northwest public agencies, public power promotion organizations and the governors of Washington, Oregon and California generally agreed that nothing should be done until:

1. The Bonneville Project Act is amended to limit BPA's power sales beyond its present operating borders to surplus power not needed in the Northwest.

2. A more extensive study of a Northwest intertie is completed, examining more thoroughly than the BPA study use of extra-high voltage lines, their use as "common carriers," defense values of such heavy ties, and northward flow of power that may be possible because of diversity in peak load period of the two areas.

California has criticized the BPA study as "an overly conservative appraisal of a resources development which holds tremendous potential." The state already has announced it will make an independent study on those lines, whether or not Oregon and Washington join, as they are likely to do.

Pit No. 3 Tie Shows 2.79:1 Ratio at 200 Mw

The BPA study examined six transmission plans including 230-kv and 345-kv lines and capacities ranging from 160,000 kw to 510,000 kw. The line originally proposed by PG&E and BPA—a 95-mile, 230-kv interconnection between Klamath Falls, Ore., and PG&E's Pit No. 3 generating plant—showed a benefit to cost ratio of 4.13 to 1 at 160,000 kw capacity and a ratio of 2.79 to 1 at 200,000 kw. Cost of the line, which would be built by PG&E, was estimated at $4,191,800 at the lower capacity requiring no additional facilities beyond the line, $5,800,000 at the higher. The BPA surplus secondary would be wheeled over an existing 230-kv line of California-Oregon Power Co. from BPA's southernmost station at Yamsey, Ore., for the 65 miles to Klamath Falls. PG&E would pick up the wheeling tab.

Result of adoption of the plan would be that BPA would have in short order a market for some of the surplus secondary it is likely to have going to waste in the Northwest for the next ten years. The total surplus

Urged for Northwest-California Tie

secondary can amount to as much as 25-billion kwhr in an extremely wet year. It is available in usable amounts at least four months, often 12 months. Estimated return to BPA from the sale of part of this to PG&E would be in the neighborhood of $1.8 million annually. For PG&E the BPA surplus would replace thermal generation in the San Francisco Bay area.

In analyzing other plans the study found:

- A second 230-kv circuit from Redmond, Ore., to PG&E's Butt Valley Power Plant on the Feather River in California would cost $11.8 million.
- Considering the U.S. Columbia River power system and the Bureau of Reclamation's Central Valley system by themselves, a 230-kv circuit from Yamsey to Keswick would require a $10.8-million federal outlay.
- Construction of only a single 230-kv circuit to PG&E Pit No. 3 plant was found financially feasible, assuming if BPA sells surplus secondary at established rates.

Central Valley Link Would Affect Northwest Industries

In studying coordinated operation of the Central Valley project and the BPA system the study found no appreciable benefit when utilizing only secondary energy surplus to Pacific Northwest needs. Only by disregarding existing commitments, including CVP's contract with PG&E now running to 1971, could the average critical period capability of the two systems be increased significantly over isolated operation. The increase would amount to about 500,000 kw, but would deprive aluminum and other industrial facilities in the Northwest of some of the high availability interruptible power supplies and the provisional power upon which they now depend. Forty per cent of BPA's annual revenues comes from such direct industrial customers using both firm and non-firm power.

For this reason and the fact that additional hydro installations in the Northwest and in Canada will reduce the diversities between the two systems, only secondary energy surplus to the needs of the Pacific Northwest was considered in analysis of feasibility of an interconnection.

With the study's determination (in an opinion by the regional solicitor of the Interior Department) that wherever Columbia River federal power goes over federal lines the preference right for public agencies goes also, the Northwest's public power groups found themselves in a schizophrenic position. From their comments they obviously want Bonneville to dispose of secondary that cannot be used in the Northwest and thereby stave off the long-threatened increase in BPA's basic $17.50-a-kw-per-year rate. Just as obviously they favor high voltage federal interconnections instead of circuits owned and controlled by a private utility.

Private utilities had no quarrel with position of the Northwest preference agencies and the public power associations that legislation to preclude extension of the Bonneville Act preference provision beyond the California-Oregon border is necessary.

They pointed out, however, that no such problem is involved when a non-preference utility builds a line to take advantage of BPA's orginal "come and get it" offer. Not that Northwest private utility executives are any less fearful than their preference agency colleagues over California designs on Columbia power. "If the preference clause were permitted to operate," commented E. Robert de Luccia, vice president and chief engineer of Pacific Power & Light Co, "California would draw off the power faster than the people of the Northwest could get their hands on it."

The legal situation is that there is now no set statutory boundary to the BPA's marketing area. Solely by administrative decision of the Secretary of Interior the Oregon-California boundary has been set as the dividing line between territories of BPA and the Bureau of Reclamation. As the law reads BPA can sell power wherever it can transmit it economically.

A question partially unanswered was whether a public agency such as the state of California, building its own lines to connect with BPA or arranging a wheeling agreement to do the same, would be eligible for preference rights. The attorneys general of Oregon, Washington and California think it would.

Nobody in the Northwest wants to open the door wide and nail it open. Some of the public power theorists would like to open it as wide as it will go so long as it has an automatic closing device protecting their needs. Officially, California has disclaimed any designs on power needed in the Northwest.

Defined BPA Service Area Recommended

Paul J. Raver, superintendent of Seattle City Light, ex-Bonneville administrator and American Public Power Assn president, suggested an amendment of the Bonneville Act to set a specific BPA service area beyond which preference provisions would not apply. He felt also that interconnections with other areas might be "more or equally feasible" than the Northwest-California tie.

Like most other public agency consultants, Raver felt that sufficient importance was not given in the BPA study either to diversity of peak load periods between the Pacific Northwest and California and possibility of a resulting northward flow of California off-peak surplus or the national defense values.

"It is felt that the firming up of Northwest power by excess energy from California and the mutual standby facilities for both areas which would be provided would warrant a substantial increase in the capacity of the intertie," Raver commented.

Except for including the Mica Creek project on the upper Columbia in its resources study, the report does not probe into effect of Canadian developments on the Columbia or the Peace River on feasibility of the California-Northwest intertie.

While the subject was not broached in the Jan. 25 meeting, many of the interested parties see a relationship. Consensus is that any firming effect of Canadian projects on the Columbia system is at least eight to ten years away—a time when the maximum availability of BPA surplus secondary would tend to diminish anyway.

Eble Tells AIEE,

- Soviets glamorize engineering profession, Con Edison president tells Winter Meeting; U. S. freedom, though, brings out 'finest efforts'

- James Fairman, winner of Edison Medal, says lack of understanding on economics, uneasiness on safety hamper A-power as much as technical aspects

- Clarence Linder of General Electric nominated to succeed President J. M. Foote; John Scott Medal goes to Dean A. Lyon; prize-paper awards given

The Russians are intent on surpassing us in industrial capability, to which electric power is fundamental, the American Institute of Electrical Engineers was told Feb. 1 at the opening of its Winter General Meeting in New York.

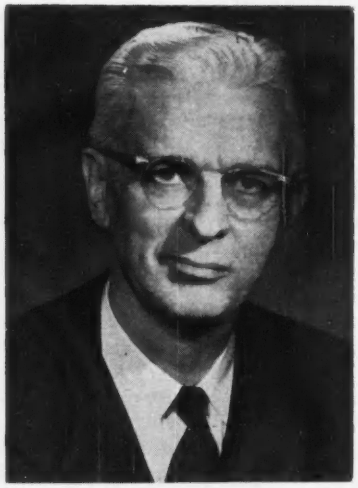
"But I don't think Soviet Russia will overtake us unless there's a radical change in our respective systems," declared Charles E. Eble, president, Consolidated Edison Co of New York. "If they adopted the incentives and awards of free enterprise and we abandoned them, then this might come about."

A Day for Con Edison

Eble spoke at last Monday's opening general session, which he characterized as "Con Edison Day." His speech was the principal one, and Con Edison's senior vice president, James F. Fairman, received the AIEE's highest award—the Edison Medal. Fairman was honored for his "outstanding performance in improving the design of large electric power systems and for his work in the atomic field and efforts to improve the engineering profession."

Noting that before World War II engineering and technical talent were rare in Russia, where he was recently a visitor, Eble continued: "In a totalitarian state, you can make things happen whether the people involved like it or not. Interestingly enough, they have employed incentives which make it so desirable to be an engineer that there are thousands more candidates than could possibly be used.

"They have glamorized the profession. They pay higher rates for engineering talent in money and preferential treatment. They completely finance the education and training of those young people qualified and selected for engineering careers. They are obviously building for both the present and the future by creating a vast pool of engineering talent."



LINDER: Nominated to succeed Foote

Pointing out that a free society doesn't "crank out engineers," Eble said: "This might be a big handicap. Yet it is not such, but rather the source of our strength. We have grown to greatness because our system is based on freedom of the individual, and this freedom has served to bring out man's finest efforts."

Engineering Leadership Needed

But unless the American power industry can solve its problem of attracting a reasonable share of the highly competent young engineers, where can it find the engineering leadership that will enable it to maintain its technical pre-eminence, the speaker asked.

Although the so-called glamor industries—electronics, rocketry, and the like—skim off the cream of the crop, there are challenges in nuclear energy, higher-voltage transmission, direct conversion of heat into electricity, thermonuclear power, and solar energy to attract engineering talent, he said.

Industry Needs Talented Young Men

STUDENT AWARDS are conferred by AIEE Pres J. M. Foote, right, to Robert Allington, center and Robert C. Sommer

EDISON MEDAL recipient is James Fairman, center. Award was made by Foote, left, prior to Charles Eble's address

"Clearly, our industry hasn't done the job of selling itself well enough to engineering students," declared Eble. "It's a job in which engineering societies, such as your own, can make an important contribution."

Public's Ignorance Hurts A-Power

In accepting the Edison Medal from J. M. Foote, AIEE president, Fairman noted: "The present drive to achieve nuclear power has been hampered as much by the general public's lack of understanding of the economics of power production and its uneasiness concerning safety as by any other factors.

"Those who play upon the fears of the people," Fairman said, "contribute nothing to the solution of the problem and ignore the inevitable need of all mankind for new energy sources. Those who envision pie in the sky while dismissing the cost and ignoring the blank spaces in our knowledge contribute to a debilitating disillusionment.

"As its contributions to 'Atoms For Peace,' our profession can overcome the technical obstacles to economic power production, and we can contribute to public understanding and acceptance of our work," he continued. "Above all, we must exercise care that engineering does not become another tool of the propagandist, the fearmonger, the huckster."

The general session launched the week-long convention whose numerous technical sessions are expected to attract some 5,000 engineers from all over the country and from abroad.

At the general session the John Scott Medal was awarded to Dr Dean A. Lyon, Woodbridge, Conn., scientist and consulting engineer, for his invention of a method of producing the first useful optical coatings for the reduction of light reflections. It was presented by D. C. Rubel, vice president, the City Trusts of the City of Philadelphia, which administers the Scott Medal award.

Linder Nominated

The general session also was informed that Clarence H. Linder, vice president, General Electric Co, has been nominated to succeed Foote as AIEE president for 1960-61.

Linder, a resident of Scarsdale, N. Y., was a director of AIEE in 1956 and has been active in finance, planning and coordination, and inter-society relationships. He is an alumnus of the University of Texas. Since early 1960, he has been vice president and group executive of the GE Electric Utility Group.

Nominated to be directors were: Robert B. Gear, Commonwealth Edison Co; Charles T. Hatcher, Con Edison; and Cullen T. Pearce, Westinghouse Electric Corp. W. R. Clark, Leeds & Northrup Co, was nominated to be treasurer. The balloting on these candidates will be announced at the Summer General Meeting.

17 Men Cited for Papers

Prize-paper awards presented at the general session went to: V. S. Thomander and R. C. MacIndoe, Westinghouse; R. F. Estoppey, Weston Instruments; G. E. Adams and T. W. Liao, GE; M. G. Poland, Bonneville Power Administration; F. J. Trebby, Kaiser Aluminum & Chemical Co; Kuei Chuang and L. F. Kazda, University of Michigan; N. F. Schuh, Westinghouse Electric Corp, and R. J. Tallent, Boeing Airplane Co; F. J. Mullin, California Institute of Technology; R. M. Hubbard, Boeing; Robert Allington, student, Lincoln, Neb., and Robert C. Sommer, student, New York; and awarded *in absentia*, F. M. Cahen and R. A. Tellier, Paris, France.

Utilities Widen Their NEW

National Electrical Week gets broader recognition and promotion, but one big company voices an air of disenchantment

"We are so besieged with weeks that the public is generally weak from weeks."

This comment by a utility promotion manager reflects the view of several companies contacted late last month for a National Electrical Week round-up. Despite the disenchantment, however, Electrical World's informal survey indicated the week's observance was acquiring a gradually widening scope.

PG&E Offers Appliances

Pacific Gas & Electric Co will offer its support mainly through promotion of the $20,000 free drawing sponsored by the Northern California Electrical Bureau on March 25. The drawing is being held in conjunction with NEW, when dealers will be showing new appliances.

First prize is $1,000 worth of appliances of the winner's choice; 35 more winners will get a major appliance and 105 more will get smaller devices. Entry blanks are sent out with PG&E's *Progress*, a newspaper mailed with bills, and are also available at the company's offices and at dealer stores. While this promotion is handled by the bureau, PG&E is its biggest customer. The contest is open only to the utility's 2.2 million customers.

A similar drawing two years ago was termed very successful. It brought 100,000 persons into appliance stores where their entry blanks were validated by dealers. The entry blanks have a space for contestants to fill in what appliance they intend to buy next, so the dealers get a prospect list in addition to heavy store traffic.

PG&E is giving the contest and related NEW promotion the status of a major one-month ad campaign (it has five or six such campaigns during the average year). Ads will run in 300 daily and weekly papers. There also will be radio spots and commercials on PG&E's new farm radio news broadcast. No open houses or mayor's proclamations are taking place on the system, but groups of students from the 13 divisions will take plant tours on Science Youth Day. One group of 35 youths will have a 300-mile plane trip to tour Vallecitos atomic plant.

Chicago EA Accents Children

The accent is on school children again this year in the Chicago area. The Electric Association for the third time will be host to home economics teachers who will tour The Merchandise Mart's "Electrical Wonderland." While attending a luncheon there the teachers will learn that their classes may visit the exhibit, in many cases as part of the regular home economics curriculum.

For the second year in a row, science students are being invited to tour the local factories of the industry. About 5,000 are expected to make visits.

High school seniors will be learning more about the electrical industry's opportunities, if a new association activity goes over. It is designed as a continuous program that will provide close contact with school authorities in making known the opportunities. "It should attract many young people to seek their life's work in our great industry," the association says.

Another new activity involves a 12-page Chicago Tribune supplement that includes a full-cover picture of Thomas A. Edison. This will appear Feb. 11.

Speakers Provided for Groups

Meanwhile Commonwealth Edison Co and the association's speakers bureau will fulfill more than 100 speaking engagements before civic and social groups. On Feb. 5 a civic luncheon will find the Executive Club hearing Don Mitchell, president of Sylvania Electric Products, Inc.

Eleven of Northern States Power Co's bigger steam plants will be opened for junior and senior high school students on Feb. 11. Response to invitations indicated last week that at least 500 youngsters would be visiting. This activity and a series of radio spots are two NSP undertakings for NEW.

IT'S OFFICIAL IN CHICAGO: Mayor R. J. Daley signs proclamation. Beside him, left, is W. M. Spain, local NEW chairman who is with Federal Pacific Electric; standing are Harry King, Chicago Tribune, and G. M. Bard, Electric Assn

Activities

In its comprehensive promotion line-up, Consolidated Edison Co of New York, Inc, lists some of these projects on hand:

- Nine showings of the film "The Life of Thomas Edison" at service clubs.
- Dealer window posters.
- NEW school programs.

Detroit Edison Co is using 134-line ads in its three metropolitan dailies and in the labor papers. Plant tours, radio spots, cooperative TV-radio spots, and a mayor's proclamation also will take place. The company plans to expand NEW activities next year.

Philadelphia Electric Co's plans include newspaper ads, radio spots, a TV spot, and window displays.

Portland General Electric Co is repeating its "Electricity at Work" high school contest this year, but has moved the date back to March. It involves projects dealing with the energy, its theories and principles. For sophomores, juniors and seniors. The two best project builders get $500 and $250 scholarships, other winners get merchandise.

As for the disenchanted, the most outspoken criticism came from the promotion manager quoted at the beginning. After describing his firm's single activity, he said:

"This is the extent of our NEW effort and if we could ever get anything that would be real tangible from NEW headquarters other than having the governor sign a declaration or the mayor snip a ribbon to a new substation, we'd certainly be prone in this part of the country to [try] something worthwhile."

About 50 cities will be showing Edison Electric Institute's newest Live Better Electrically film.

'ELECTRICAL WONDERLAND,' a feature of Chicago's Merchandise Mart, will be visited by teachers during NEW. Later home economist students will tour

Murray Bill Gets Support From Public Power

A proposed bill to create a "Joint Congressional Resources Committee" and a "White House Resources Council" got rousing support last week in hearings before the Senate Interior Committee.

The Bill (S-2549) was introduced by Sen James Murray (D-Mont.) and now has 30 sponsors.

Witnesses during the first week of hearings—mostly public power partisans—stressed features of the bill which would make it possible to establish a single, comprehensive, federal resources development program. They cited Soviet power progress as summed up in the recent special Senate report (EW, Jan. 11, p 20). They also pointed out the need for an "authoritative inventory" of this nation's hydro power potential, and ridiculed several power projects during the past few years as "piecemeal" and "myopic"—Hells Canyon, Dixon-Yates, the proposed Pacific Gas & Electric Co Intertie to mention just a few.

Hearings to Be Continued

Hearings will be continued in mid-February to hear, first, representatives of federal agencies—Interior and Defense Departments in particular—and then later opposition witnesses.

California Gov Edmund Brown pointed out in last week's hearings, "It is simply good business for the Federal Government to recognize and invest in the vast potential of the West" and its water and power resources. He called for "giant" EHV transmission lines, operated as common carriers, and he told of plans to prepare his own study of the need for a federal power interconnection between Bonneville Power Administration and the Central Valley project.

Brown also charged, "The so-called 'underdeveloped nations' of the world . . . may be more impressed by the manner and rate of development of our natural resources than our armed might . . . It is most disturbing and disheartening to learn that the Russians' present rate of growth in electric power capacity is faster than that of the U. S. It is deplorable, too, to learn that the Russians have built bigger dams, bigger turbines, longer and

higher-voltage transmission lines than we have."

Colorado Gov Steve McNichols testified that, "if such an agency . . . had been at work during the past seven years, I seriously doubt that we would have been faced with Dixon-Yates, or with partial development of Hells Canyon, or with the no-new-starts policy that has hamstrung reclamation development."

Wisconsin Gov Gaylord Nelson said, "The essence of this bill . . . is its emphasis upon its inventory feature. Before we can plan sensible development of our resources, we need to know what these resources are. The information that we do have . . . is often inaccurate, incomplete or totally lacking, and if this bill points a way toward filling this gap, it will be immensely valuable."

Andrew Biemiller, AFL-CIO's legislative director, pointed to Soviet power progress and ridiculed the Administration's power program.

"Policies must be more than merely stated, they must be translated into programs," he said. "One means of approaching this goal is to reorganize the overlapping and duplicating functions and areas of responsibility of federal action and regulatory agencies dealing with natural resources."

James Carey, IUE president, took a slightly different tack from Biemiller. He pointed to the difficulty in reorganizing federal agencies—he called them "minor kingdoms"—and pointed out that the Murray bill would coordinate resource policy without disturbing the existing administrative agencies.

Alex Radin, general manager of the American Public Power Assn, pointed out that the new resource agencies could perform a complete inventory of the nation's hydro power potential, called for recently by Dr Bruce Netschert of Resources for the Future (EW, Feb. 1, p 12). Radin quoted a recent speech by Federal Power Commissioner William Connole, before the Electric Consumers Information Committee, which called for a national energy policy. Radin said Connole had termed the present policy "helter skelter. . . I see decision after decision on fuel policy without a major premise to go on."

Mrs Arthur Whittemore, a director of the League of Women Voters, endorsed the Murray bill as a means of promoting "integrated" and "comprehensive" river basin planning and development. "The League," she said, "has found through four years of study that there is in fact no national water policy, but rather a hodge podge of policies . . ."

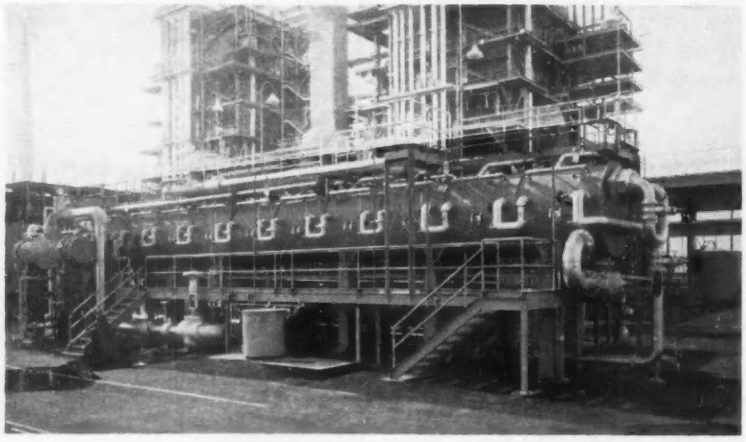
Angus McDonald, coordinator of the National Farmers Union, endorsed the bill, "particularly at this time because of the willful and continued neglect of this Administration" in resource development.

Opposition to New Agencies

Two notes of warning were registered at the hearing, but in both cases, the witnesses emphasized that they were in accord with the general principles of the Murray bill. C. R. Gutermuth, vice president of the Wildlife Management Institute, endorsed S-2549, but cautioned that the proposed resource bodies should be "alert to the dangers of being led into narrow or single-resource channels of inquiry and interest."

The other warning came from William Hammerle, forester for the American Pulpwood Assn, who pointed out, "No real purpose of efficient government can be achieved by adding another agency without making sure that existing agencies drop the service duplicated. It is our opinion that the bill will merely set up another agency within the government, at additional cost to the taxpayers," and one which will "lend confusion to," rather than clarify or coordinate, any federal resource policies. Hammerle also pointed out that the proposed joint Congressional committee would "overlap and negate the functions and responsibilities of the well-established and recognized committees of the House and Senate . . ."

Hammerle summed up his opposition in four points: (1) There are sufficient existing agencies already to handle resource policy; (2) Congress "has the means available" to require coordinated planning; (3) the proposed legislation is premature, since Sen Robert S. Kerr's (D-Okla.) special committee on water resources is now preparing a report on the nation's water and hydro power resources; (4) new agencies and committees would effectively reduce responsibilities of existing Congressional committees.



Sea Water Conversion Plant on the Line

Southern California Edison Co is embarking on a 3-year research program with its recently completed general purpose sea water conversion plant. The first in the U. S. to be tied in with a steam generating plant, the new unit may pave the way for an economical method of extracting potable water from the sea by distillation. Daily output of the 26-stage flash evaporator is 100,000 gal. The unit heats sea water to 170 F and flashes it into vapor, which flows under reduced pressure into the first stage. The vapor is condensed and collected as fresh water.

Design Reshapes 230-Kv Line Towers

Indiana utility builds station-system tie economically by designing towers without broken-conductor requirement. Tower weight reduced

J. J. TRAINOR, Vice President, Public Service Co of Indiana, Plainfield, Ind.

W. C. FREEMAN, Transmission Engineer, Sargent & Lundy, Consulting Engineers, Chicago, Ill.

A rectangular tower, designed without broken conductor requirements, was developed by Public Service Co of Indiana for the 230-kv transmission facilities tying New Albany Station to the system. The requirements could be dropped because the company had not experienced a broken conductor on high-voltage lines since it adopted ACSR.

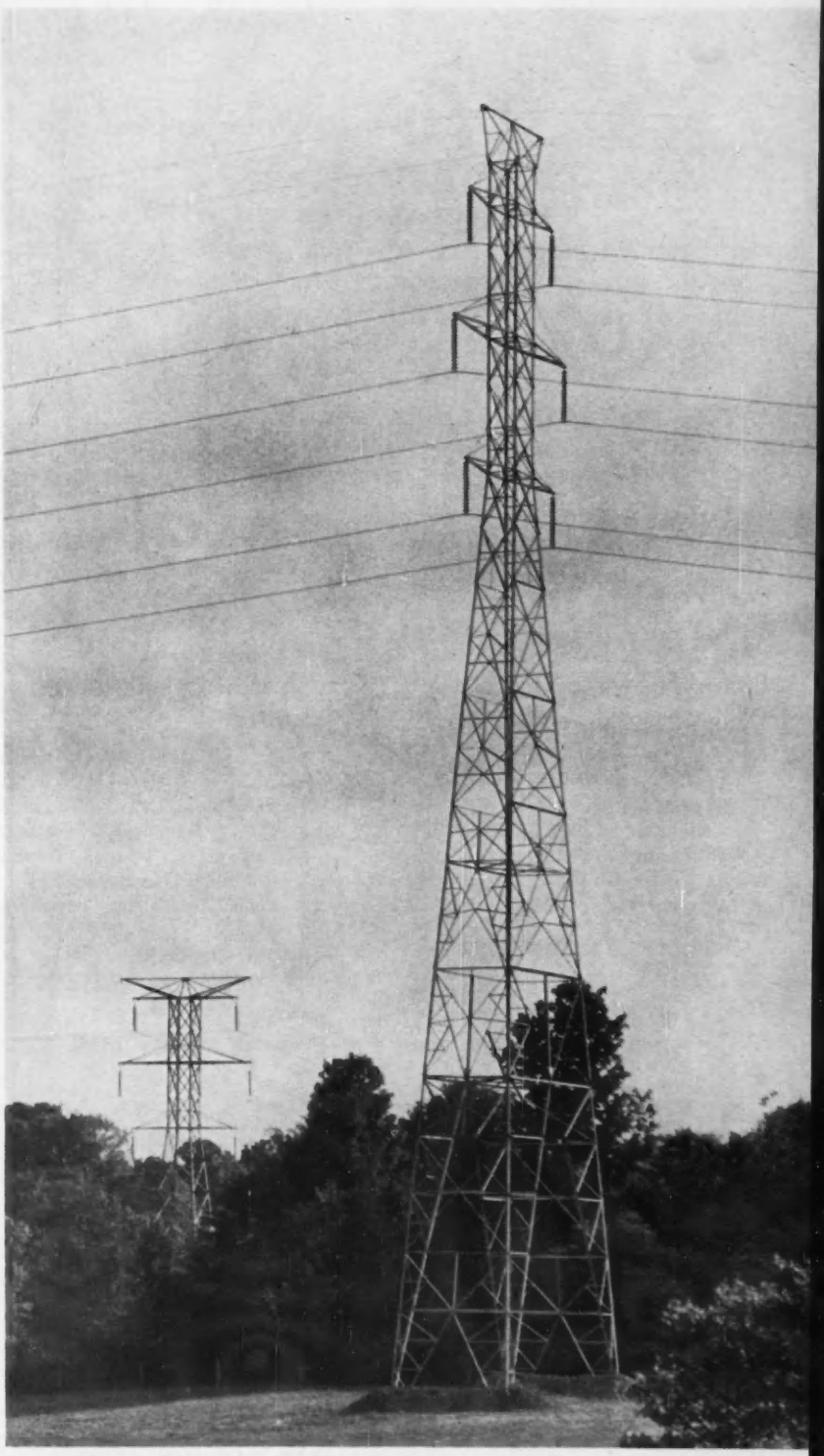
Building the new line will be considerably cheaper than building earlier ones. Among the factors cutting its cost are: Lower and lighter towers; less longitudinal load on towers; an adaptable footing; a more efficient conductor size; and, a new purchasing procedure.

New Tower 30% Lighter

The new tower weighs 12,000 lb in contrast to the previous 17,000-lb tower. The lighter tower resulted from the use of high-strength steel, principally in the legs, where the weight of required steel was reduced. This yielded considerable savings.

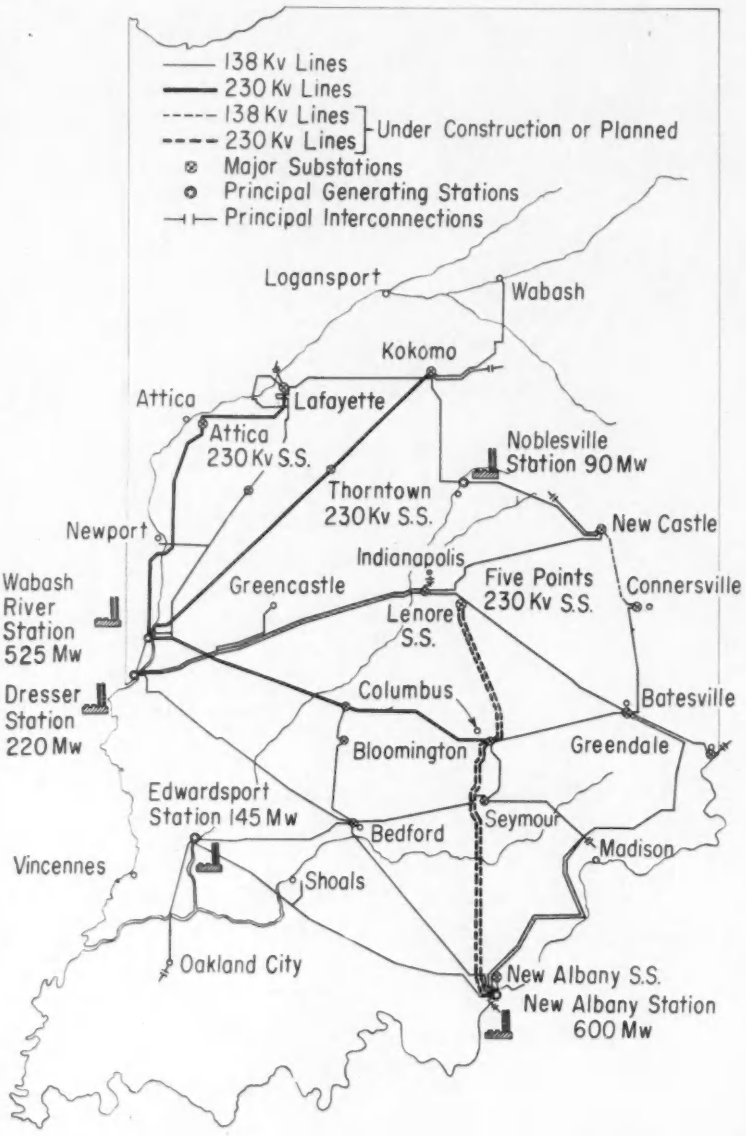
Formerly, the company's procedure was the usual one. It wrote a functional specification establishing the loading requirements of towers and then obtained bids from tower suppliers. But, in planning the new line, it assigned to its engineers the complete design of the tower on which it then obtained bids from tower fabricators and suppliers. This procedure sharpened the competition among bidders, with consequent tower-cost savings to Public Service.

The company's older 230-kv double-circuit steel tower lines were designed for six 900-MCM 54/7



TANGENT TOWER was designed for maximum span of 1,100 ft and maximum angle of 2 deg. Crossarms 122 ft above ground give clearance over 132-kv line

PSCO Ind. Integrates Newest Station



New Albany Station, with four, 150-Mw units, is being integrated into the system by 68 miles of double-circuit, 230-kv tower line now under construction. The new line extends from the station at the southern end of the system to the 230-kv substation at Five Points, near the center of the system. Another line, planned for 1961, will extend 38 miles west from Five Points to a substation east of Indianapolis. The unique design of towers is described in the accompanying article.

ACSR conductors and one $\frac{7}{16}$-in. EHS galvanized steel shield wire. The conventional design provided for a longitudinal loading of one broken conductor. The lines are in the heavy-loading area which calls for a conductor design based on ½-in. radial ice and a 4-psf wind. As heavy ice occurs, a loading of 1-in. of radial ice without wind was included in the tower-loading requirement.

Conductor to Save $20,000

Conductors on the new line are 954-MCM 45/7 ACSR, and the ruling span is 1,100 ft. As this conductor is within 0.003 in. of the diameter of the 900-MCM 54/7 ACSR, it permits the use of some hardware items stocked for the latter. Moreover, the 45/7 stranding is the more economical as it contains a higher percentage of aluminum and provides more load capacity. The new conductor is expected to save about $20,000 for the 68-mile section of double-circuit line. The new ground wire is $\frac{7}{16}$-in. EHS galvanized steel.

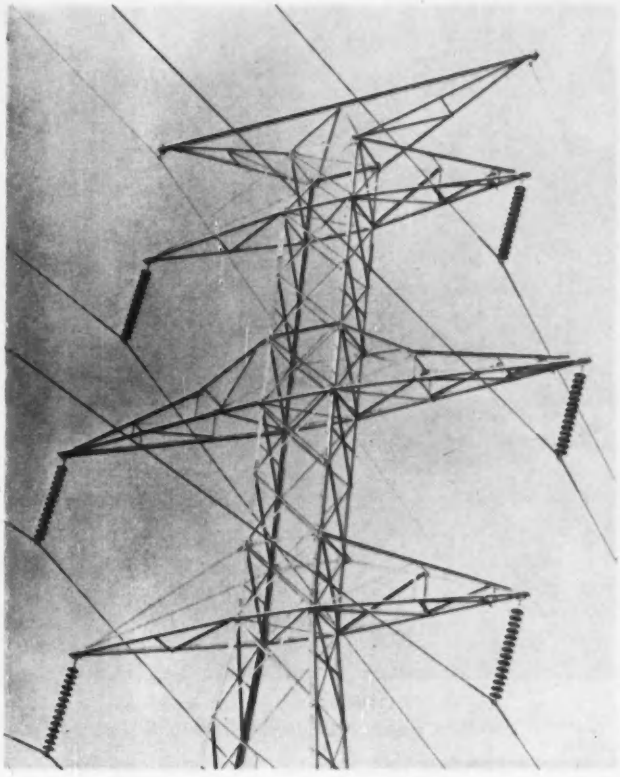
The line is designed for 0.5 lightning outages per 100 miles of line per year. Maximum shielding angle is 20 deg. Suspension insulator strings consist of 14 5¾ by 10-in. units, and deadend insulator strings are double-yoked assemblies of two strings of 16 5¾ by 10-in. units. Insulators are 15,000-lb M&E units.

Air Gap Is Generous

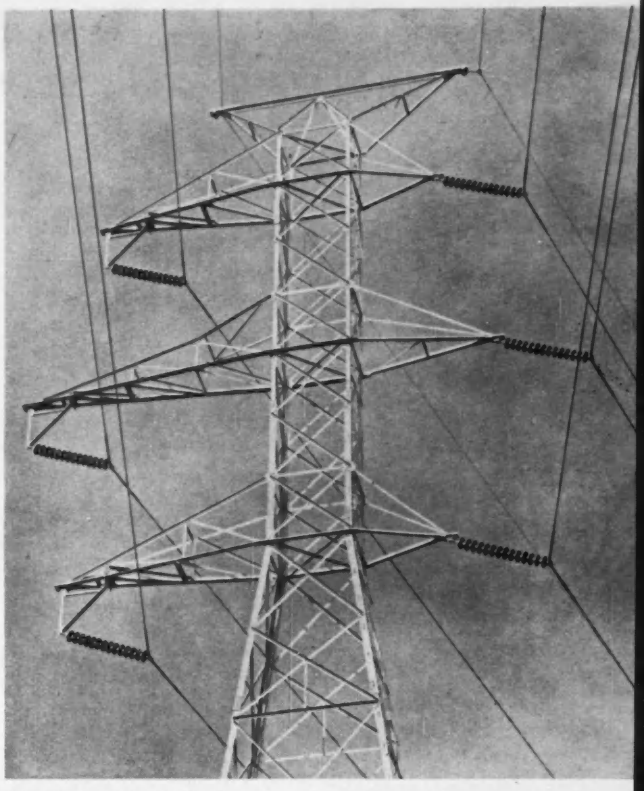
The 14-unit suspension string coordinates with a 76-in. air gap at 4 μsec with a 1½ by 40 wave. Clearance from conductor to tower steel of 76 in. is provided at temperatures between 30 and 120F with a 4-psf wind. Clearance between conductor and tower steel is 42 in. at OF initial tension with an 8-psf wind. The same clearance is provided at OF with a 4-psf wind and ½-in. of radial ice. The 42-in. clearance gives enough air gap for switching surges three times the normal line-to-neutral voltage. Minimum conductor-to-steel clearance with a 45-deg insulator swing is 60 in. (National Electrical Safety Code requirement).

Midspan clearance of ground wire to conductor in a 1,100-ft span is 33 ft.

The new tower design was developed in the light of past experience



LIGHT-ANGLE TOWER was designed for angles up to 15 deg and 1,000-ft spans, or spans of 2,600 ft without angle



TOWER-TOP DETAILS of medium-angle tower shows crossarm offset, also the method of suspending the conductor

and after consultation with other utilities. Overload factors applied for Grade B construction with towers were:

1.27 for vertical loads
2.54 for transverse wind loads
1.65 for angle loads and longitudinal loads on deadend towers
1.1 for longitudinal loads on suspension towers.

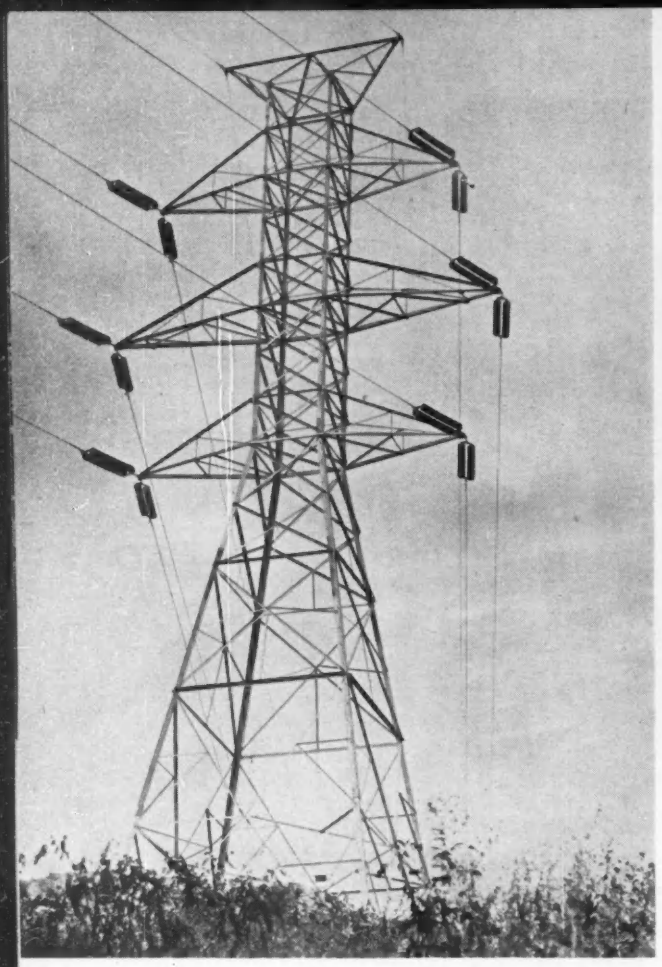
Instead of designing suspension towers for a load corresponding to a broken conductor, the company based its design on a load of 4,500 lb. This load corresponds to the tension which might exist during stringing, or about a third of a broken conductor's. The 4,500-lb longitudinal stringing load was considered with a wind load of 2 psf and no ice, plus the normal vertical load. Maximum tension of a conductor is 12,000 lb; that of a ground wire is 7,500 lb. The reduction in longitudinal loading made it possible to depart from the conventional square tower and to establish a more economical and flexible rectangular one.

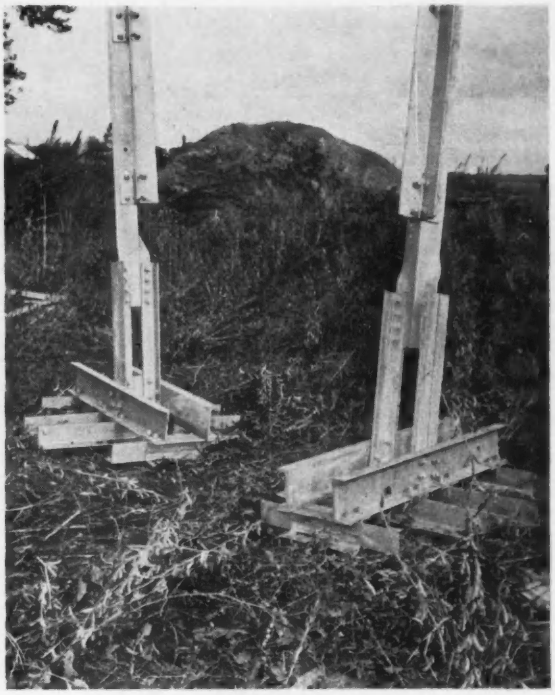
Towers were designed for a basic crossarm height of 72 ft above ground. A vertical crossarm separation of 18 ft with a middle crossarm offset of 4 ft was preferred to a 20-ft separation with a 2½-ft offset as more economical. The reduced

Data for Six Tower Types Required for the Line

Description	Tower Designation	Maximum Span	Maximum Angle in Line	Ground Wire and Conductor Attachments
Tangent [1]	5A2	1,100 Ft	25 Deg	Suspension
Light Angle & Long Span [2]	5B15	1,100 Ft	15 Deg	Suspension
Medium Angle	5B30	1,100 Ft	30 Deg	Suspension
45 Deg Angle Deadend [3]	5C45	1,250 Ft	45 Deg	Full-Deadend
70 Deg Angle Deadend	5C70	1,250 Ft	70 Deg	Full-Deadend
90 Deg Angle Deadend [4]	5D90	1,250 Ft	90 Deg	Full-Deadend

[1] Also designed for a 1,420 ft span with zero degree line angle.
[2] Also designed for a 2,600 ft span with zero degree line angle.
[3] Also a tangent deadend tower.
[4] Reduced tension on one side, for use at substations.





FOOTING has surface to keep soil pressure loading below 7,400 psf

ANGLE DEADEND TOWER was designed for maximum span of 1,250 ft and a 45-deg line angle. On the tower as shown here, jumper loops have not yet been installed

tower height from this arrangement cut the tower leg load considerably, although the increased torsion due to the extended middle crossarm partially offset this saving, particularly in the deadend towers.

At first, rigid porcelain struts were considered for controlling insulator swing, but their cost more than offset savings from the use of shorter tower arms.

In all, six tower types were required for the line. A tangent tower was tested to failure to determine the adequacy of the design. It was subjected to various vertical, longitudinal, and transverse loads representing the spans and angles involved. The loads with overload factors were placed on the crossarm horizontally and vertically.

There were four basic tests. The first represented a heavy vertical load of 1 in. of ice on one side of the tower with a total load of 22,995 lb. The second represented the longitudinal stringing load with a 2-psf wind and no ice. With a total vertical load of 17,721 lb and total transverse load of 3,826 lb, a 4,950-lb longitudinal load was applied in turn to each crossarm.

The third test represented normal heavy loading of ½-in. ice with a 4-psf wind. The total vertical load was 25,521 lb; the total transverse load 21,960 lb. The fourth test was a continuation of the third, carried to failure by increasing the transverse loads.

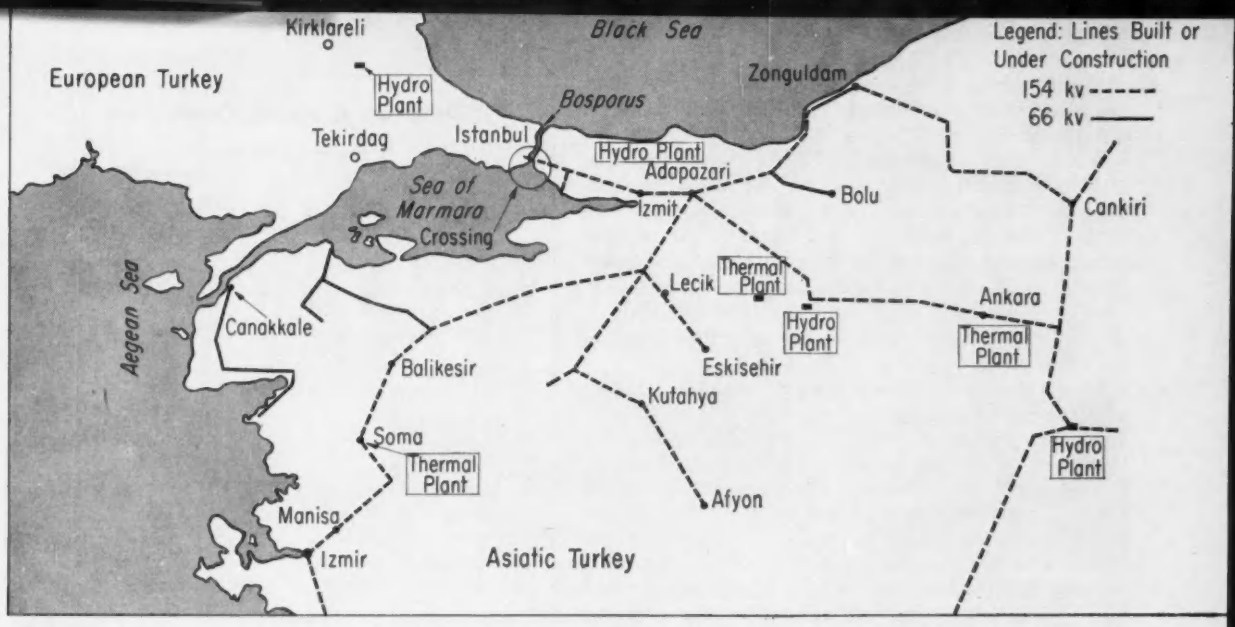
Towers Withstand Tests

The tower withstood the loads. At failure, the load was 12.4% greater than that for which it was designed. Lateral tower deflection was measured at the tower top and at the level of the bottom crossarm. For test 3, normal heavy loading, the top deflection was 17¼ in., and crossarm deflection 5 in. The tower was carried to failure by increasing the transverse load in 1,000-lb steps. Just before failure, top deflection was 17¾-in., and bottom crossarm deflection 5 in. The tower failed with a transverse loading of 24,680 lb. Failure occurred in the first and second panels below the bottom crossarm.

An earlier study of footings showed that when a line is constructed through an area of varying soil types, no one type footing has a clearcut advantage. In the flat sections near towns, a concrete type would cost least. In the rough country, concrete footings are not as economical as steel grillage.

Tower footings were designed to develop enough uplift with normal setting depth in soil, which has a 30-deg cone of rupture. In poorer soils, instead of enlarging the footing with concrete, or by other methods, the footing was lowered by steps so that it would engage more earth and develop the full uplift requirements.

The footing was designed with enough surface area so that soil pressure loading will not exceed 7,400 psf under heavy loading conditions.



BOSPORUS STRAIT divides European from Asiatic Turkey, Istanbul being in the former, Ankara in the latter. The trans-Bosporus transmission line at 154 kv will supply Istanbul from newly developed power sources in Asia

154-Kv Spans Historic Bosporus

Construction begins on aerial transmission linking Istanbul to Asiatic power sources

H. W. TILESTON, Electrical Engineer, Stone & Webster Engineering Corp, Boston, Mass.

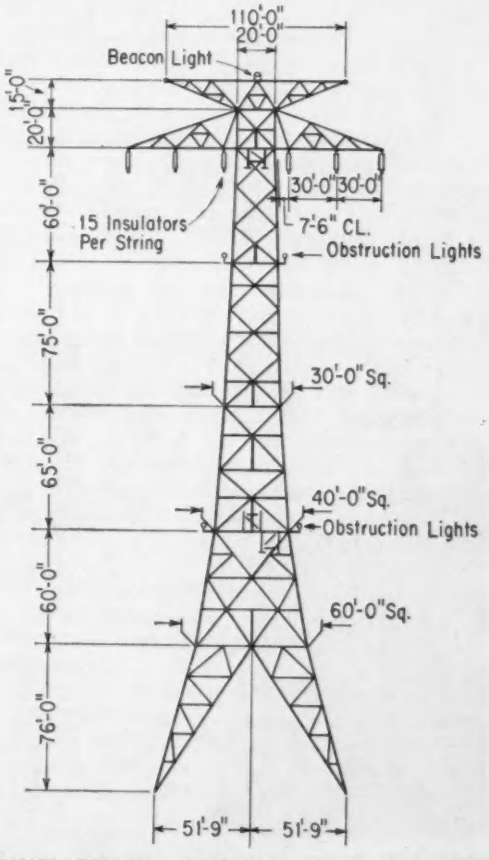
Construction has begun on two 154-kv circuits and two overhead ground wires, constituting the aerial transmission line over the Straits of Bosporus for bringing electrical power from Asiatic Turkey to Istanbul and its suburbs on the European sides. Most of the country's recent generation expansion has been in the Asiatic portion.

Although the Bosporus is narrowest a short distance north of Istanbul, this site was not available for construction of the transmission facilities. It is occupied by two ancient forts, Rumelishisar and Anadoluhisar, respectively on the European and the Asiatic or Anatolian sides. The forts control water traffic from the Black Sea, which passes through the Straits of Bosporus to the Sea of Marmara and through the Dardenelles to the Mediterranean.

As the historicity of these forts prohibited use of the narrowest crossing for the transmission line, a location somewhat south of the forts was selected.

The transmission line was designed on the basis of a minimum clearance of 193 ft 7 in. at 113F, in accordance with the Turkish electrical code. Advantage was taken of the sharply rising terrain on both sides of the Bosporus in placing the high suspension towers. These are 371 ft, and the conductors are deadended on them with strain insulators that are adjustable by means of turnbuckles. All strain is on the adjacent anchor towers.

Each of the two circuits is deadended on a separate



SUSPENSION TOWER is 371 ft high and 103 ft 6 in. wide at the bottom. Terrain rises sharply on both shores

anchor tower in a triangular configuration. Anchor towers on the European side are 72 ft high; those on the Asiatic side, 62 ft high.

Yokes with triple strings of 16 clevis, fog-type, 25,000-lb insulators are used for the dead-end connections. Single strings of 13 ball-and-socket, fog-type, 15,000-lb insulators are used in the jumper loops. Special dead-end hardware on the conductors consists of a steel wire rope socket connected to the steel core of the conductor. An aluminum body is slipped over the wire rope socket and compressed in the usual manner.

Crossing conductors are special 795-MCM ACSR, composed of 54 aluminum strands over 37 steel strands, having an ultimate strength of about 80,000 lb. The steel core is greased to retard corrosion. The two ground wires for lightning protection are $\frac{9}{16}$-in. 19 No. 9 Copperweld, extra-high strength, having an ultimate strength of 30,610 lb.

The European anchor span is 3,050 ft, the main crossing 5,246 ft, and the Asiatic anchor span 1,540 ft. The accompanying tabulation gives the expected 113F bare final tension and the 23F maximum loaded tension with ice and wind.

The suspension tower weight is about 185 tons each, including ladders and platforms.

The average anchor tower weighs about 8 tons.

Data on Crossing Conductors

Phase Conductors

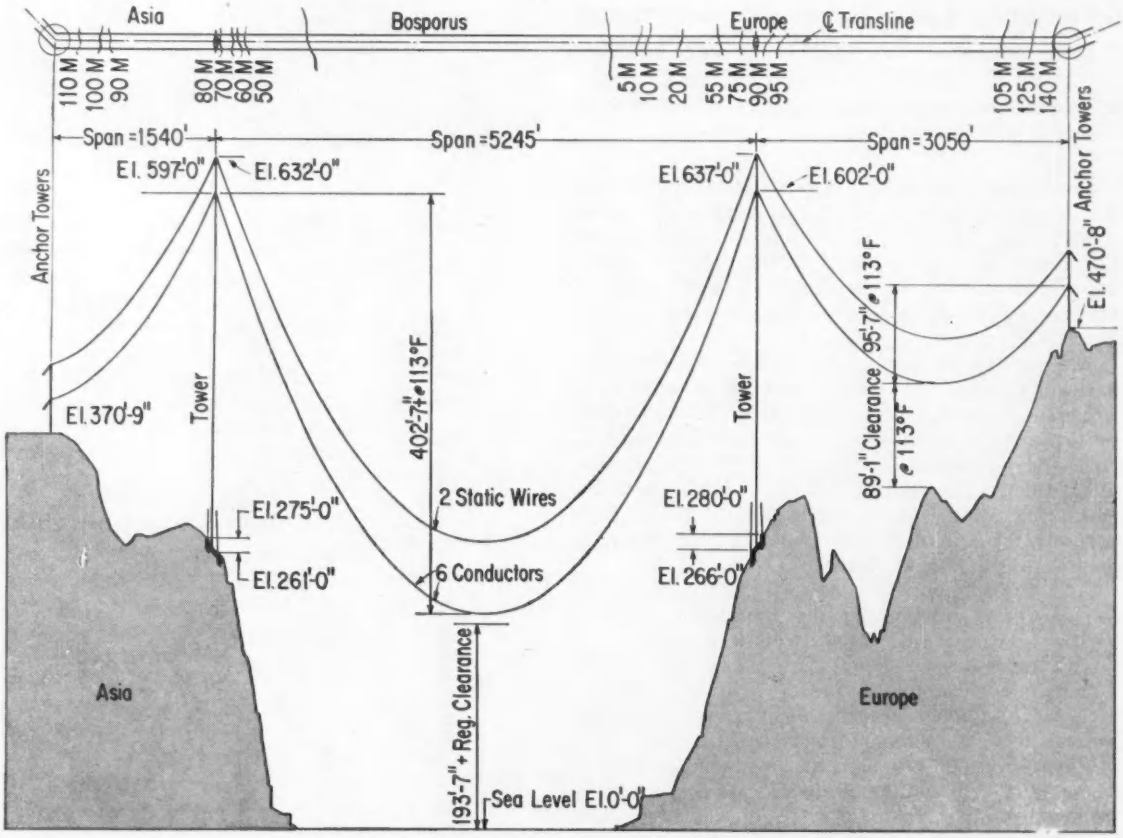
Area, sq in.	1.0488
MCM	795
Stranding, ACSR	54 A1/37 St
Overall Dia, in.	1.333
Steel Strand Dia, in.	0.1214
Alum. Strand Dia, in.	0.1214
Weight per ft, lb	2.243
Ultimate Strength, lb	80,000

Ground Wires

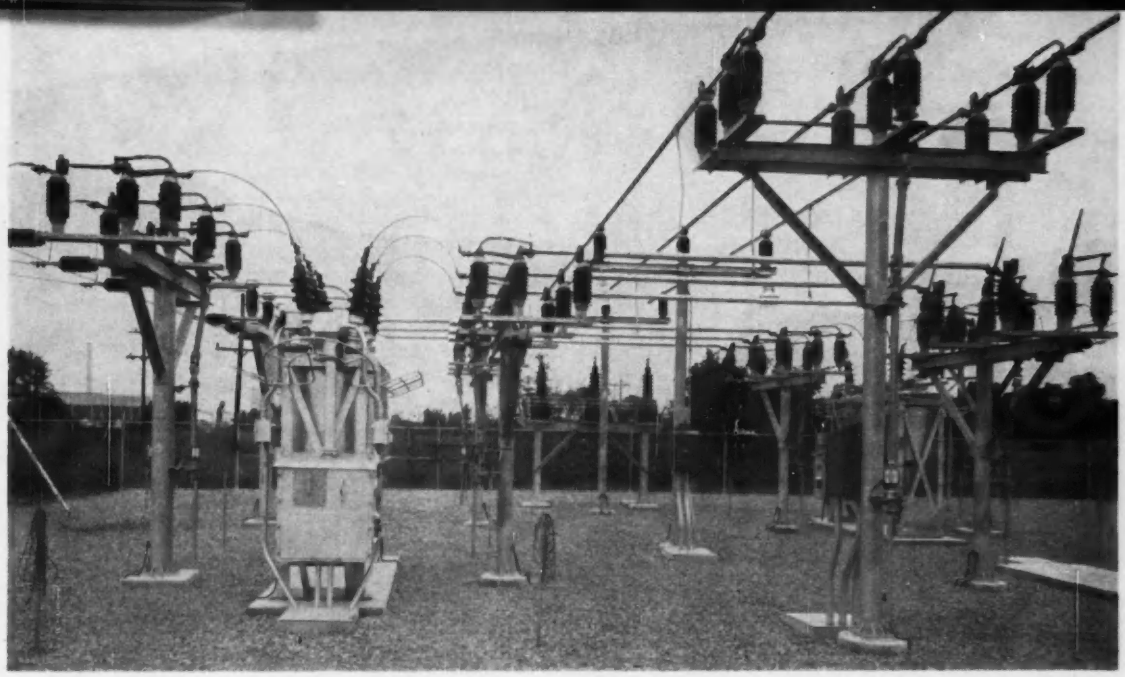
Area, sq in.	0.1954
Stranding	19 No. 9 CW
Overall Dia, in.	0.572
Strand Dia, in.	0.1144
Weight per ft, lb	0.7
Ultimate Strength, lb	30,610

Final and Max. Conductor Tension

	Tension, lb	
Span, ft.	113 F Bare	23 F Loaded
3,050	17,492	26,129
1,540	17,492	26,129
5,246	19,407	26,547



PROFILE shows transmission line as designed to afford a 193-ft 7-in. clearance over the Bosporus Strait, only waterway between the Black Sea and the Sea of Marmara for traffic to and from the Mediterranean



TEE-TYPE STEEL STRUCTURES support horizontal disconnects in the new Luzon substation whose less conspicuous profile, lower costs and more adequate conductor clearances are all conducive to the design's use by Detroit Edison

Low Substation Cuts Costs

Luzon design for 40-kv bus structures helps Detroit Edison win area acceptance

BURKHARD H. SCHNEIDER, Project Engineer, Detroit Edison Co, Detroit, Mich.

Economic advantages and a low and less conspicuous profile were realized in the design of Detroit Edison Co's new Luzon substation.

Since World War II and until the Luzon design was developed, 40-kv strain bus steel substation structures were built up of standard rolled sections. These provided for line tensions of about 1,500 lb per wire and 27 ft of clearance between the line and the driveway surrounding the structure. Disconnects were mounted in the inverted position. This type of structure gave very satisfactory service: line positions were easy to add, and there were no safety problems because of an adjacent hazard. Maintenance is not difficult as the flat surfaces of the rolled sections are easy to paint, in contrast to box-type girders.

But experience over the past ten years indicated that the provisions for the relatively high line tensions, and the clearance under the line conductors, could rarely be used to advantage. There was also considerable pressure for making substations less conspicuous. These factors prompted the Luzon substation designed with a low profile at some sacrifice of line considerations.

The principal features of the Luzon substation, in contrast to previous Detroit Edison practice, are:

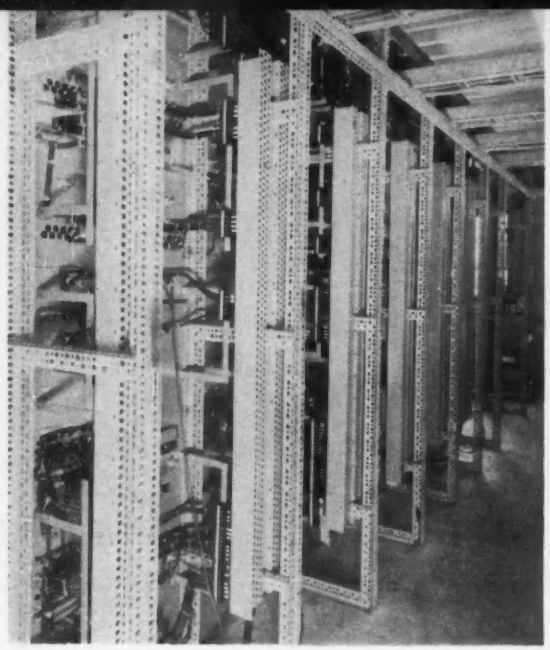
1. All disconnects are horizontally mounted, opening in a vertical plane.
2. Line tension is 500 lb per wire.
3. Clearance to grade from live parts is 10 ft 6 in.
4. Main bus is rigid.
5. Aluminum conductors are used throughout.

Aluminum conductors, used in strain-bus-type stations, had proved to be economical and generally very satisfactory. The other features were either new to Detroit Edison or had never been defined. Land requirements were the same as those for the previous design. Overhead line poles were kept as low as practicable and their number to a minimum although allowable terminal tensions were reduced to one third of those in the past.

All disconnect and bus supports were designed as tee-type steel structures with a supporting leg of standard steel pipe sealed at top and bottom. An 8-in. ASA Schedule 30 pipe was used for line positions to afford sufficient section modulus to withstand the 500-lb line tension. Maximum use was made of the inherent strength of the disconnect channel base by terminating the lines on insulators mounted directly on the bases. Disconnect alignment posed no problem.

For the disconnect and bus supports having no lateral tension, a standard 6-in. pipe was used. This permits deflections consistent with esthetic values and well within the stress limits. Line and bus disconnect supports weigh 700 and 535 lb, respectively, and bus supports only 400 lb. The net result was that the total weight of steel was only 25% of that in Detroit Edison's previous substation designs for a comparable number of line positions. The height of the substation was reduced from 30 to 15 ft.

The main bus is 2½ in. SPC, Schedule 40, 6063T6 aluminum. The leads from disconnects to breakers and



PRE-PUNCHED ANGLE MEMBERS of the Erector-set type support control center panels, affording a construction of low first cost which is easily assembled in the field

taps from the main bus are 500 and 1,000-MCM SAC. All connections, except between flat surfaces, were welded, using the inert-gas, shielded-arc method.

Internal-fitting end connectors on the tubing terminations reduce loss of strength from heating. "Top-hat"-type tee-connectors were employed for the stranded conductor taps from the main bus.

Tests on both types of joints showed the conductance relative to the main conductor to be considerably in excess of 100% although no special effort was made to build up a large cross-section of weld material. Tests were made also to determine the loss of strength due to welding heat. The loss 1 in. from the weld was only 25%; at 3 in. there was no appreciable reduction.

The flat aluminum pads were bolted directly to the copper faces of the disconnect and breaker terminals using the usual inhibitor treatment. Stainless steel bolts and Belleville washers maintain adequate contact pressure. Since the entire substation assembly is somewhat flexible, it was not necessary to install expansion joints in the rigid 13-ft cross tie between the bus disconnects. The distorting effect on the disconnect contacts due to thermal expansion and contraction is negligible.

As the stringing tension on the line entrances was very low, a line-type clamp-top, post insulator with straight-line dead-end clamp was used for the line termination in place of conventional three 10-in. disks. Sag in these disks would have been unsightly.

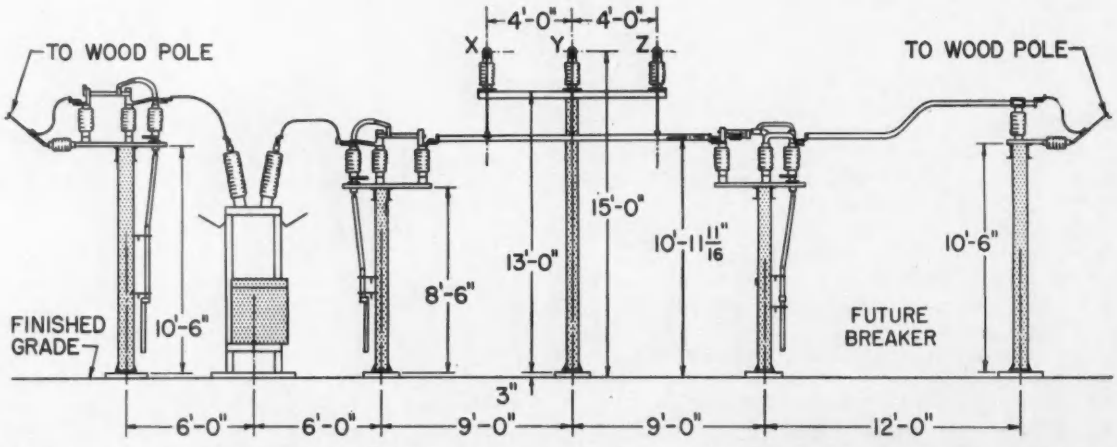
All station controls are carried in underground ducts to a control center. The ducts are terminated inside the building near the floor on the outside walls. From there the control cables are carried in open trays to the relay panels, which are sectionalized to provide maximum flexibility for changes.

Individual panel sections are mounted on a framework of pre-punched angle members. These were purchased in 10-ft lengths and cut to size with a special shear-type cutter. No fittings of any kind join these members; they are bolted together in Erector-set fashion. The principal advantages of this type of construction are low first cost and the ease with which they can be assembled in the field.

Vertical trays were used for control cables to avoid lacing and bundling the conductors behind the panel. The trays are plastic which does not support combustion and has a snap-on cover.

The features incorporated in the Luzon substation brought a saving of about 33% of the cost per line position, exclusive of equipment. Because the weight of steel was decreased by 75%, a maintenance saving can be expected.

Investigations into the use of structural aluminum for this type of construction are under way to reduce maintenance and erection costs further. Nearly as important as the economic gains are the improved appearance. The less cluttered appearance of this substation type should go a long way in helping Detroit Edison to be a better neighbor.



LINES were terminated on insulators which were mounted directly on disconnect channel bases. Disconnect switches are horizontally mounted, opening upright in this low-elevation Luzon-type substation

Narrow Voltage Band Saves Capital

Regulator bandwidths as close as 1½ v give customer voltage, bring economies in serving more load and area

M. W. GANGEL, Distribution Application Engineer, Electric Utility Engineering, General Electric Co, Schenectady, N. Y.

Bandwidth is the most important single characteristic of a feeder voltage regulator. The best distribution system voltage control and most economical performance are both achieved by setting regulator bandwidth as narrow as is practical. Step size assumes similar importance because it is of primary significance in determining bandwidth.

Differences in bandwidth of as little as 1 v are important. They have marked effect on the load which can be carried on a feeder, as well as on the net revenue resulting from that load. A narrow bandwidth which permits additional load to be carried can eliminate or forestall additional investment in supplementary voltage control equipment, costly feeder reinforcement, or line rebuilding. And in the long run greater feeder loads permit serving the overall system load with fewer feeders and fewer substations.

Substantial savings are realized by connecting additional loads on voltage-limited feeders. And the resulting voltage problems can often be alleviated by proper adjustment of the regulators' bandwidth setting.

To demonstrate how narrow bandwidth can permit additional load on a voltage-limited feeder, it is necessary to observe where the voltage drop occurs. Fig 1 shows a typical distribution of voltage drop in customer services, the secondary system, and the distribution transformer. These components of peak voltage drop are generally relatively constant because of the pattern by which secondary systems develop with load growth. Additional components of the voltage spread are drop in the primary circuit, and the regulator bandwidth.

A feeder is generally considered voltage-limited when its primary drop becomes excessive. But voltage saved from the regulator bandwidth can offset an increase in the allowable primary circuit drop. Therefore a voltage-limited feeder can be freed to carry additional load by reducing the bandwidth of its regulators.

Load can be added to a feeder in either of two ways; feeder length can remain constant while the area's load density grows, or the load density can remain fixed while the feeder is extended to pick up load.

For a feeder of length L_1, with uniformly distributed load, let the original allowable primary voltage drop be V_1. Its load capabilty K_1 is proportional to V_1/L_1. But bandwidth reduction permits the allowable primary voltage drop to be increased by the amount Bwd to V_2. And K increases proportionally to K_2, a function of $(V_1 \div \text{Bwd})/L_1$. Thus the capability is boosted in the ratio

$$\frac{K_2}{K_1} = \frac{V_1 + \text{Bwd}}{V_1} = 1 + \frac{\text{Bwd}}{V_1}$$

The second term shows the magnitude of increase in capability gained by reducing regulator bandwidth. This term, multiplied by 100, is plotted in Fig 2 as percent load capability increase

If, on the other hand, density remains constant while the feeder is extended, bandwidth reduction increases the permissible length in the ratio.

$$\frac{L_2}{L_1} = \sqrt{1 + \frac{\text{Bwd}}{V_1}}$$

The increase, $\sqrt{1 + \frac{\text{Bwd}}{V_1}} - 1$,

is plotted in Fig 3 as percent load capability increase. This is equivalent to percent feeder length increase as the load density is assumed uniform.

Loads on actual feeders are not exactly uniformly distributed. And the feeders may have irregular patterns and varied conductor sizes. Therefore the percentages shown in the curves may be modified somewhat when practical considerations are added. But it is clear that a smaller bandwidth will permit a larger load to be carried on voltage-limited feeders without additional investment.

Higher distribution voltages, higher load factors, and the use of large conductors tend to make many feeders thermally-limited rather than voltage-limited. For such feeders, bandwidth reductions bring a higher average voltage level by raising the lower edge of the band. Customer voltage is still maintained within the permissible zone, but revenue is boosted by increasing the kwhr consumption of lighting and the manually-controlled resistance portion of connected load.

The revenue increase can be cal-

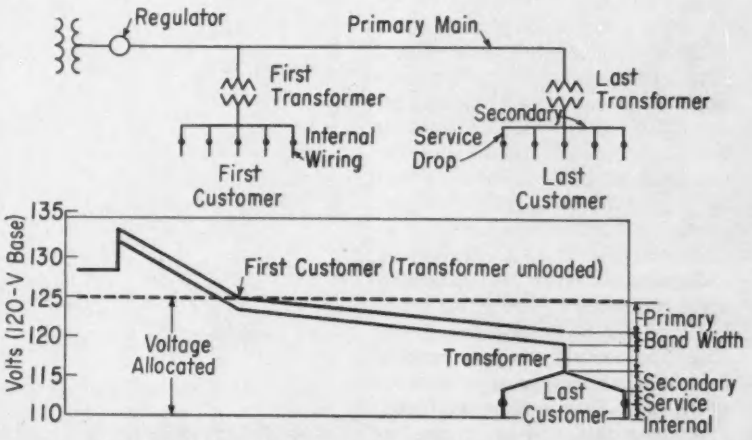


FIG 1—TYPICAL FEEDER with uniform transformer-secondary system voltage drops in services and secondary becomes voltage limited in primary circuit

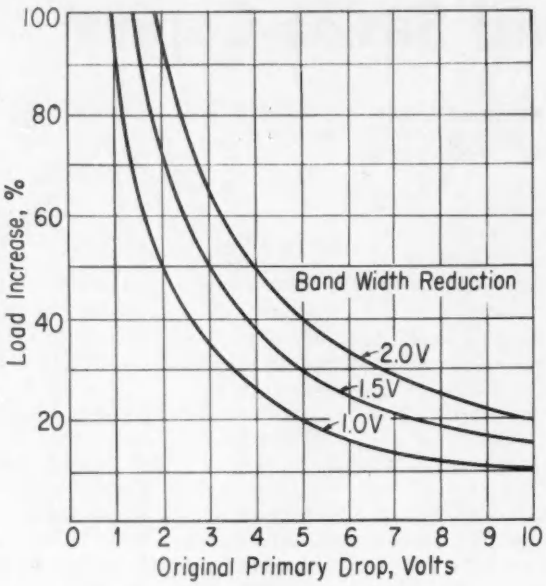


FIG 2—VOLTAGE-LIMITED FEEDER gains capability to serve heavier loads with bandwidth reduction

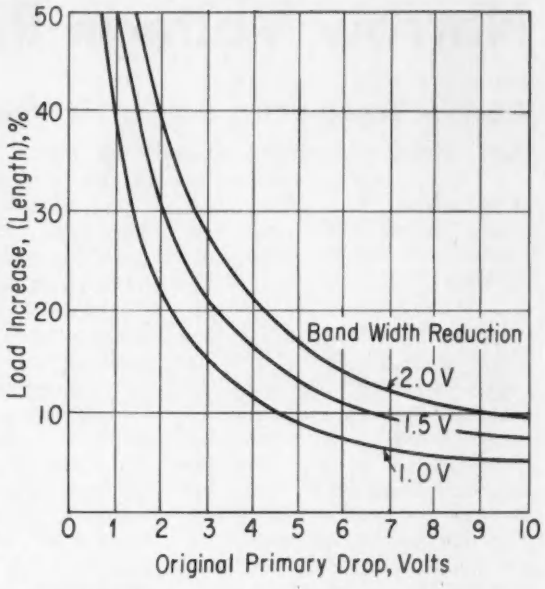


FIG 3—VOLTAGE-LIMITED FEEDER gains reach to serve bigger load area with bandwidth reduction

culated by this basic formula:

$$\text{Added Annual Revenue, Dollars} = \text{Annual Peak, kw} \times \text{Annual Load Factor} \times \frac{\text{Voltage-sensitive Kwhr}}{\text{Total Kwhr}} \times \text{Rate, Cents/Kwhr} \times \frac{1}{100} \times 8760 \times \left[\left(\frac{120 + \frac{\text{Bwd}}{2}}{120}\right)^{1.6} - 1\right]$$

The first four terms can be grouped for convenience and designated as the "Revenue Index." The last term determines added kwhr as a function of voltage level. It is based on an original feeder voltage level averaging 120 v, but its accuracy is not affected if some other practical level applies. The Bwd/2 term represents an increase in average level equal to one-half the reduction in bandwidth. The exponent would be 2 except for the fact that resistance elements of the load heat up with a higher average voltage, tending to make resistance values slightly higher. The 1.6 is empirical.

Because Bwd/2 is extremely small compared to 120 v, the entire last term can be simplified to Bwd/150. The annual revenue increase in dollars can then be approximated as 0.584 × Bwd × Revenue Index.

Assume that a 4-kv feeder has an annual peak of 2,500 kva at 0.9 pf, a ratio of voltage sensitive to total load of 0.5, a 30% load factor, and an energy charge to customers of 2½ cents per kwhr. Its revenue index is 2,500 × 0.9 × 0.5 × 0.3 × 2.5 = 844.

If the station regulators' bandwidth is reduced by 1½ v to raise the average feeder voltage by ¾ v, the annual revenue increase becomes 0.584 × 1.5 × 844 = $739. Fig 4 gives convenient solutions for other combinations of bandwidth reduction and revenue index.

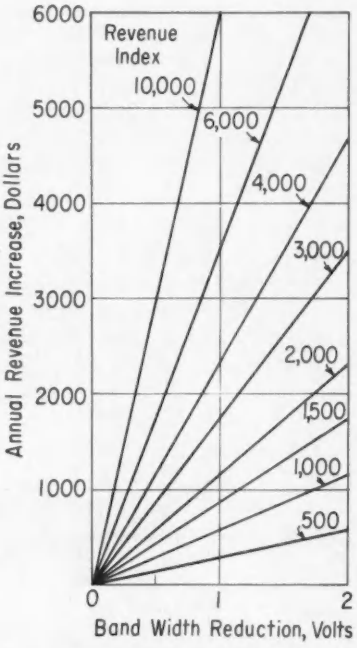


FIG 4—FEEDER REVENUE is enhanced by bandwidth reduction. Revenue Index reflects loadings and rates

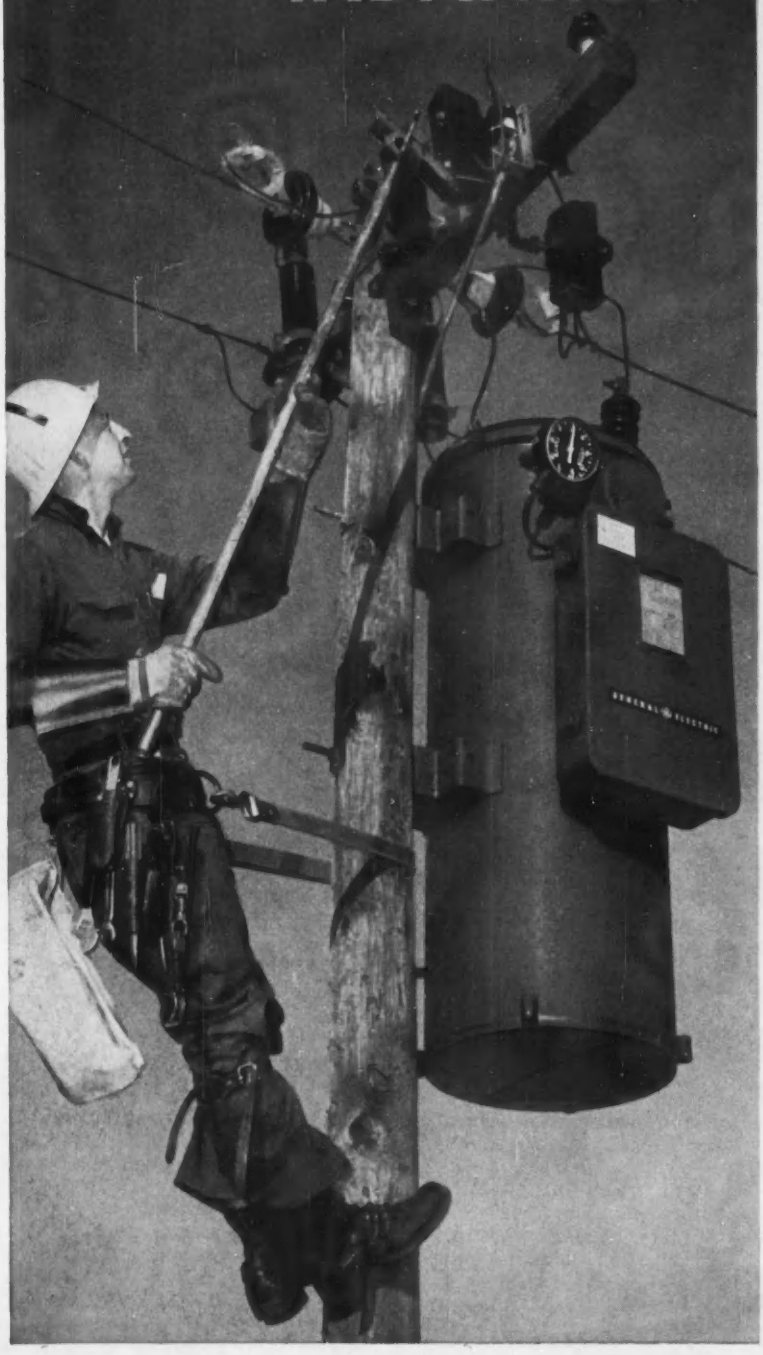
On the average, a 1% boost in average feeder voltage usually produces ½ to 1% of additional revenue. This added revenue is not obtained entirely free of cost. Generating cost for the additional kwhr and their incremental losses, along with any charge for system capacity, will reduce the utility's net profit from the increased revenue.

The minimum practical setting of bandwidth is related to regulator step size. A 1½-v bandwidth is attainable with 32-step regulators but 3 v is required for a 16-step regulator.

Utilities which have been setting bandwidths larger than 1½ v on their 32-step regulators could achieve economies by setting them closer. Those which are reluctant to go all the way to the 1½-v band might prefer "the small 2-v band" concept. This means that settings are made for a 2-v band with all tolerances in meter reading and relay handling deliberately taken in the negative direction. Of course care is taken to hold these tolerances small. This gives an actual band width of from 1½ to 2 v.

ANOTHER STEP AHEAD IN VOLTAGE REGULATION

POSITIVE NEUTRAL INDICATION



NEW

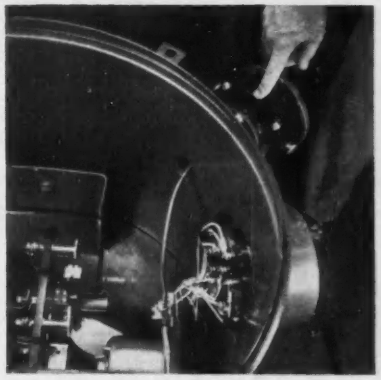
Mark-II position indicator for G-E voltage regulators protects lineman and equipment

Exclusive Mark-II Load Bonus position indicator and indicator drive system for General Electric single-phase step voltage regulators provide positive indication of tap-switch position. This gives more assurance against fear of injury to personnel or equipment when bypassing regulators on hot lines.

Linemen are aware that if a regulator is bypassed with the tap-switch off neutral position, the dead short created across part of the series winding can destroy equipment and seriously endanger the lineman.

It is important that operating personnel *know* that regulators are in the neutral position before bypassing. The new General Electric Mark-II Load Bonus position indicator provides this assurance.

New Mark-II position indicator system—standard on all G-E ML-32 regulators at no price premium—is an example of General Electric's continuing leadership in voltage regulators. This is another reason why G-E regulators cost less on the line. Ask your regulator representative for more information. General Electric Company, Schenectady 5, New York. 423-43



NEW MARK-II INDICATOR drive system eliminates possibility of indication error. Unique locking coupling and gear-driven indicator assure positive alignment of indicator hand and tap-switch position.

Progress Is Our Most Important Product

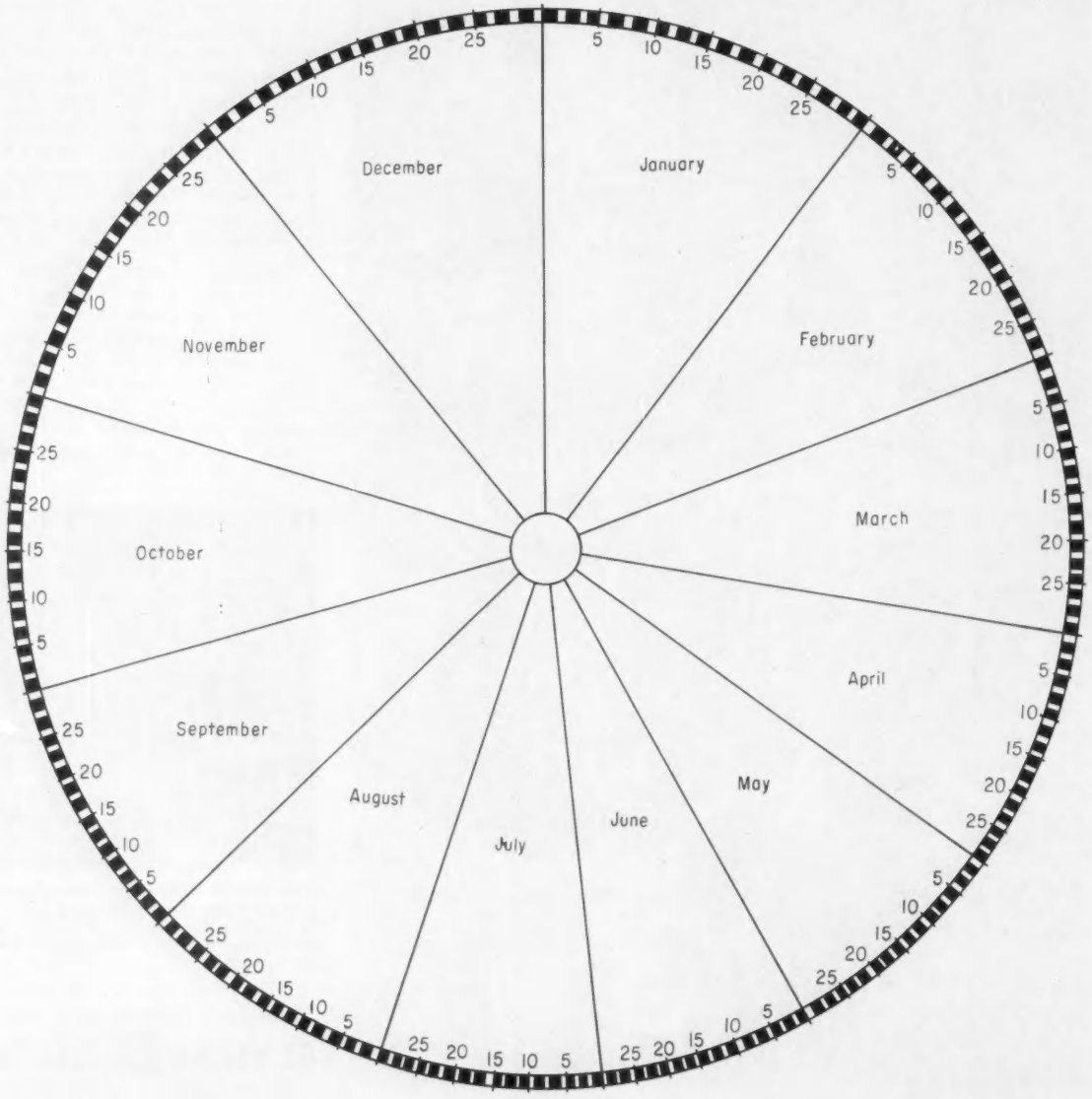
GENERAL ELECTRIC

Find Group Replacement Dates Quickly

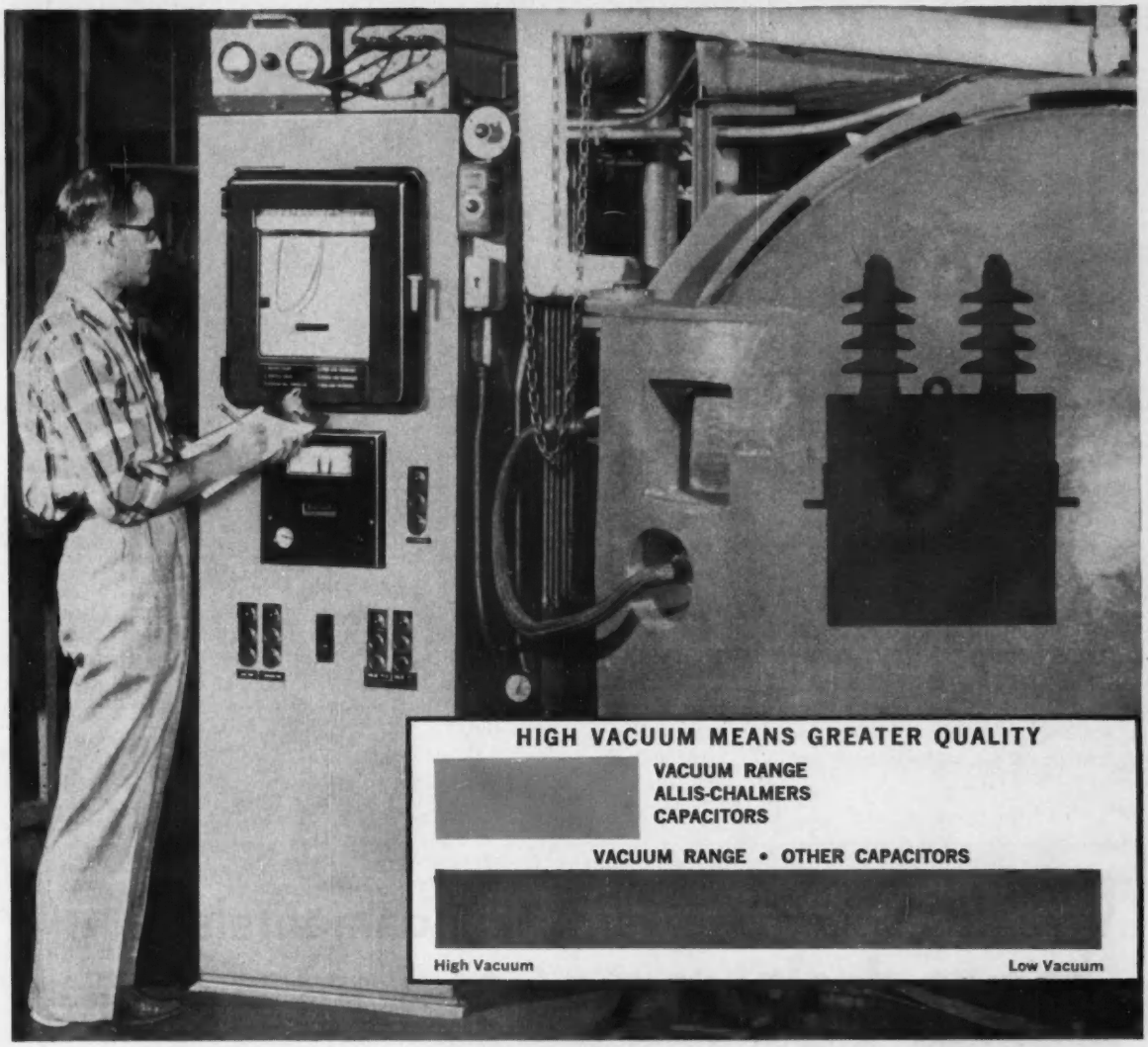
Adapted from distribution standards of the Virginia Electric & Power Co

2,000-Hr Group Replacement Chart for Street Lighting Lamps

Directions: Lay straight-edge to pass through date of installation and center of circle. Read date of replacement at intersection of other end of straight-edge with date-scale



ALLIS-CHALMERS



Extra years of capacitor life

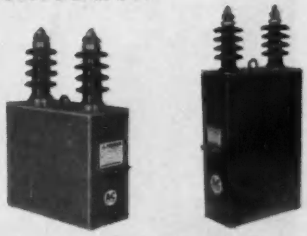
through "extra-low" drying and degasification

Why take the trouble to extract air and moisture with high vacuums? This is to guarantee that you get the greatest return from your Allis-Chalmers capacitor dollar!

Better vacuum processing — a carefully controlled combination of heat and extremely high vacuum — means better penetration of the *Chlorextol* insulating liquid into the packs. Insulating paper losses and heating are reduced, electrical strength is gained. Thorough degassing increases voltage level at which corona starts. It all adds up to a big, built-in margin of safety for severe overvoltages and high ambient temperature . . . for *extra* years of capacitor life.

For more capacitor facts, call, wire or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin. A-1220

Chlorextol is an Allis-Chalmers trademark.



Complete capacitor equipment is available for immediate shipment—25 and 50-kvar units—2400 through 7960 volts. Includes racks, voltage and current controls, other accessories.

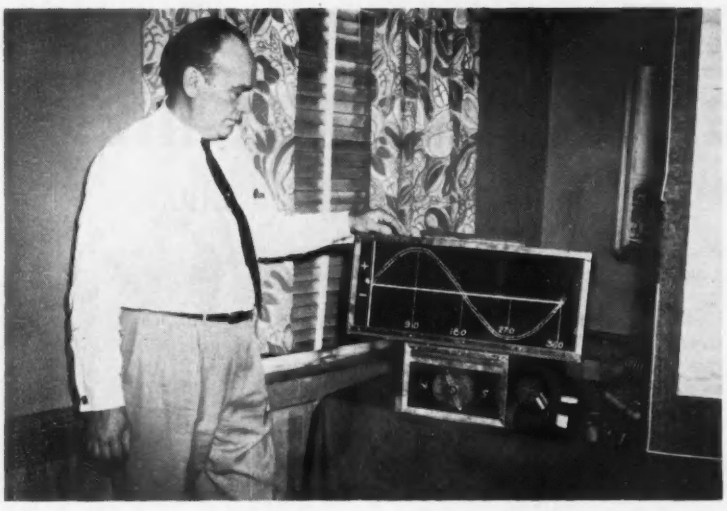
'Bubble' Shelters Rotor During Repairs

A nylon "bubble" building provided a convenient and easy-to-erect shelter for the sandblasting of a turbine rotor at Niagara Mohawk Power Corp's Albany Steam Station. The building was used in place of temporary wooden structures or hard-to-manage canvas tents formerly set up for the task.

The "bubble," 60 ft long, 30 ft wide, and 15 ft high, is kept inflated by a constantly running air blower which maintains air at 2 psi inside the vinyl-coated nylon skin. It can be readied for inflation in less than 2 hr and blown up in about 20 min. Sandbags and iron weights keep the skin anchored to the ground. The shelter can be heated by attaching electric coils to the blower unit.

The rotor was moved through a large "door" in the bubble on a railroad flat car while skin was propped in position with aluminum stanchions Then the door was closed and the balloon re-inflated.

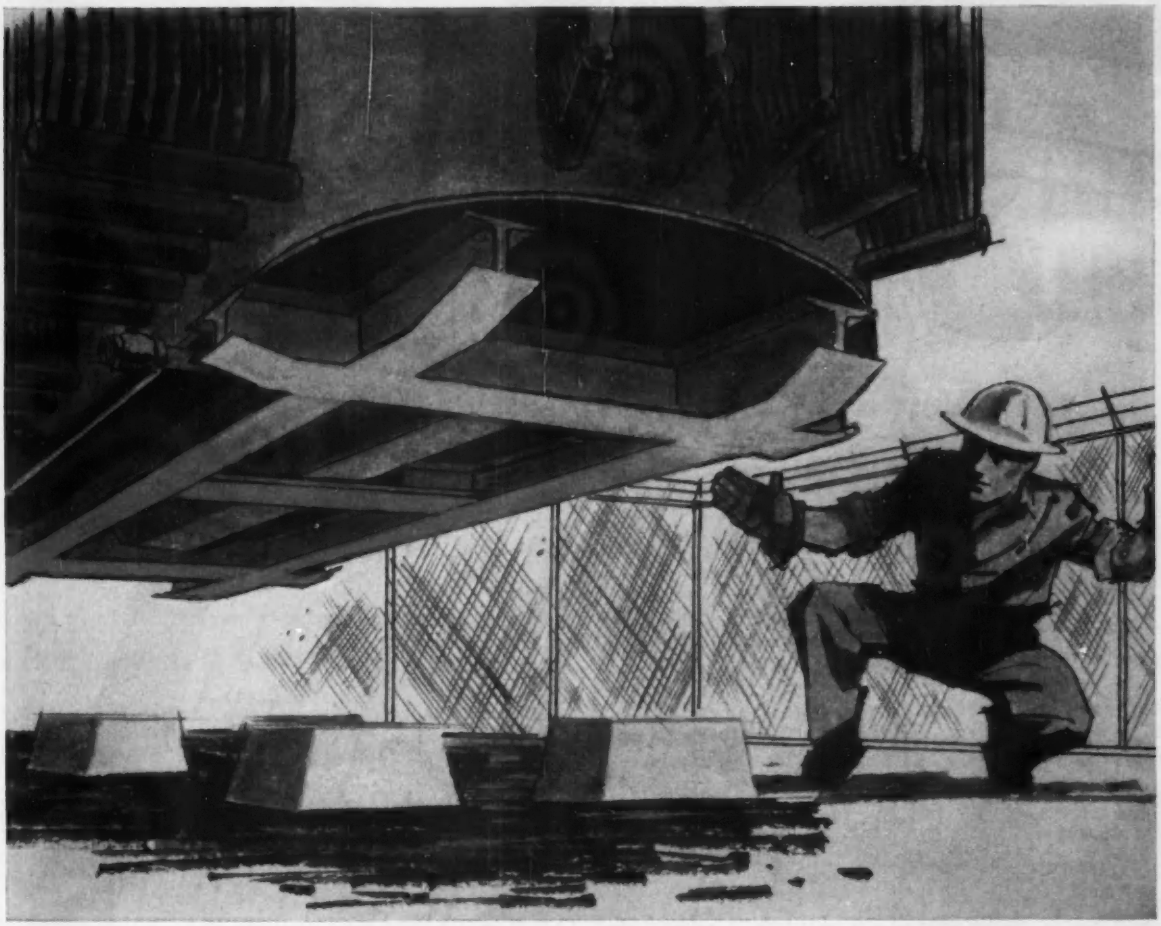
Visual Display Shows Ac Fundamentals



A "wave-form generator" for use as a visual training aid in substation and transmission line switching schools has been developed by John Lane, Kansas Power & Light Co. The device is used to help explain electrical fundamentals.

As the armature (small case illustrated) turns, a sweep arm makes electrical contact to turn on lights on the sine wave curve. This shows the relation of the generator conductor as it cuts the magnetic field to the magnitude of generated voltage. With different arrangements the device also shows lag or lead current and the phase relations of one, two or three-phase power.

ALLIS-CHALMERS



Installs for less on pier, plank or pad

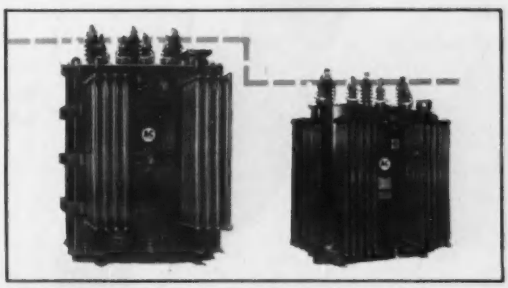
New Allis-Chalmers small power transformers are lighter, lower by 30%

Installation charges slashed! That's the start of the story for these new-design A-C power transformers. Their "hide-away" compactness and lighter weight add up to big savings in handling and pad costs. (The 34.5-kv, 3750-kva transformer, for example, weighs 8000 lb less than its predecessor.)

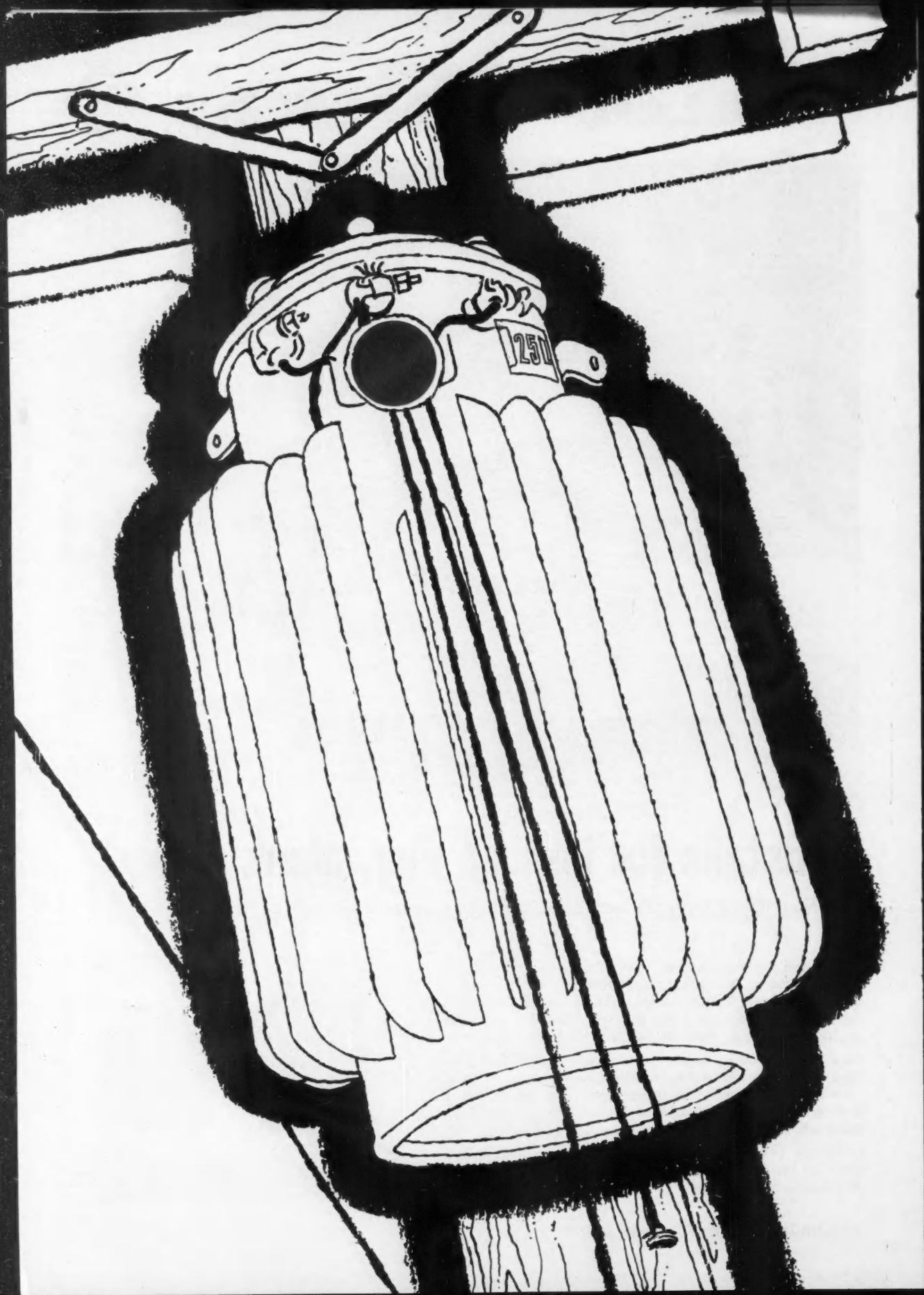
New design reduces losses, exciting current and noise level. Instruments are grouped for operator convenience. Servicing ease is assured by such features as a base sump, which collects and removes contaminants from active oil, and the built-in drain which permits sampling at the very bottom.

Get the complete story from your nearby Allis-Chalmers office or write ***Allis-Chalmers,*** *Power Equipment Division, Milwaukee 1, Wisconsin*

A-1238

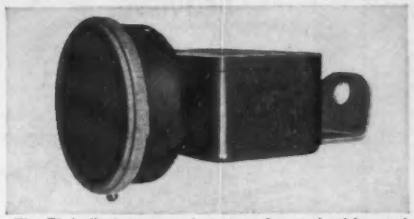


New low-profile transformer features include a self-resetting mechanical relief device that automatically resets and reseals after operation . . . and simplified handhole covers with 5 captive "J" bolts instead of 14 nuts to remove for entrance.


250

The indicator is calibrated and set at the factory to operate on 60-cycle systems at the center of its range. The indicator can be reset, however, to suit conditions which past practice demonstrates to be unusual.

NEW WESTINGHOUSE TL INDICATOR TELLS WHEN DISTRIBUTION TRANSFORMERS SHOULD BE CHANGED OUT



The TL indicator responds to transformer load in much the same fashion as a conventional demand meter and with approximately the same sensitivity. Economically significant load peaks cause it to respond, but short load "spikes" leave it unaffected. The signal light operates at a predetermined load level which can be field adjusted.

Now You Can Determine Economic Transformer Load Limits Across Your Entire System . . . Economically, Accurately and Rapidly

Proper loading of distribution transformers has long been a major utility operating problem. Underloading results in unnecessarily high capital investment, while overloading yields high operating costs and poor voltage regulation. The Type TL Load Indicator, developed by Westinghouse, now effectively opens a tremendous new area for operating cost reduction and the lessening of revenue losses.

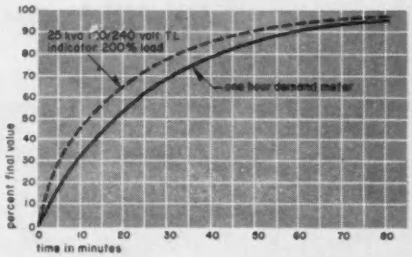
How Does This New Development Affect Load Management? Existing methods of system load measurement have been able to substantially protect you from transformer burn-outs. On the other hand, load checks based on incomplete load data or other types of indicators that require shop installation have not permitted accurate or rapid enough determination of the point at which you are no longer benefiting economically from the extra capacity which we build into our transformers. In fact, it is quite possible that you are operating in the area of loss loading long before the condition is recognized.

With the TL, it is now possible to economically, accurately and rapidly determine economic load limits across your entire system, and to determine whether the existing transformer should be replaced by a larger kva rating or an additional transformer.

Is the TL Adaptable for Your System and Equipment? The Type TL indicator is designed for economical, flexible application to either new or existing transformer installations. The TL can be mounted directly on the low-voltage neutral grounding pad provided on all distribution transformers built in the last 25 years. To install, it is only necessary that the two line leads of the low-voltage secondary pass through the openings in the back of the indicator case.

J 70936

Your Westinghouse representative will be glad to demonstrate and discuss the new TL indicator with you. Or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.



The TL indicator is adjusted for a demand interval of about one hour. This means that if a steady state load is applied, the contact arm will deflect so that it reaches 90% of full value in one hour. If the load is continued, full deflection is reached in about two hours.

Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV ALTERNATE FRIDAYS

Procurement & Products

ORDERS ▶ **Substantial upswing in new orders for power transformers and boilers** is reported by the Edison Electric Institute Power Survey Committee. A year-end summary shows that 37% of all the power transformer capacity ordered during 1959 was ordered in the last quarter. This includes units rated 501 kva and above. The same picture holds true for boilers. Over 38% of all boiler capacity, in units rated 450 psi and higher, was ordered in the fourth quarter of the year.

The EEI Committee also noted that the order lag, which started in 1957 for most types of heavy equipment, means that 1960 shipments of long-lead-time items will be relatively small.

DELIVERIES ▶ **Delays in shipment of large steam turbine and generator units** are arising as a result of the five-month steel strike, reports General Electric Co. Longest delays have been experienced in generators. For the first six months of this year some generator shipments will be delayed up to a month. By summer, however, delays are expected to be back on a normal schedule. GE spokesmen point out, however, that in no instance are the delays expected to affect start-up dates of generating capacity.

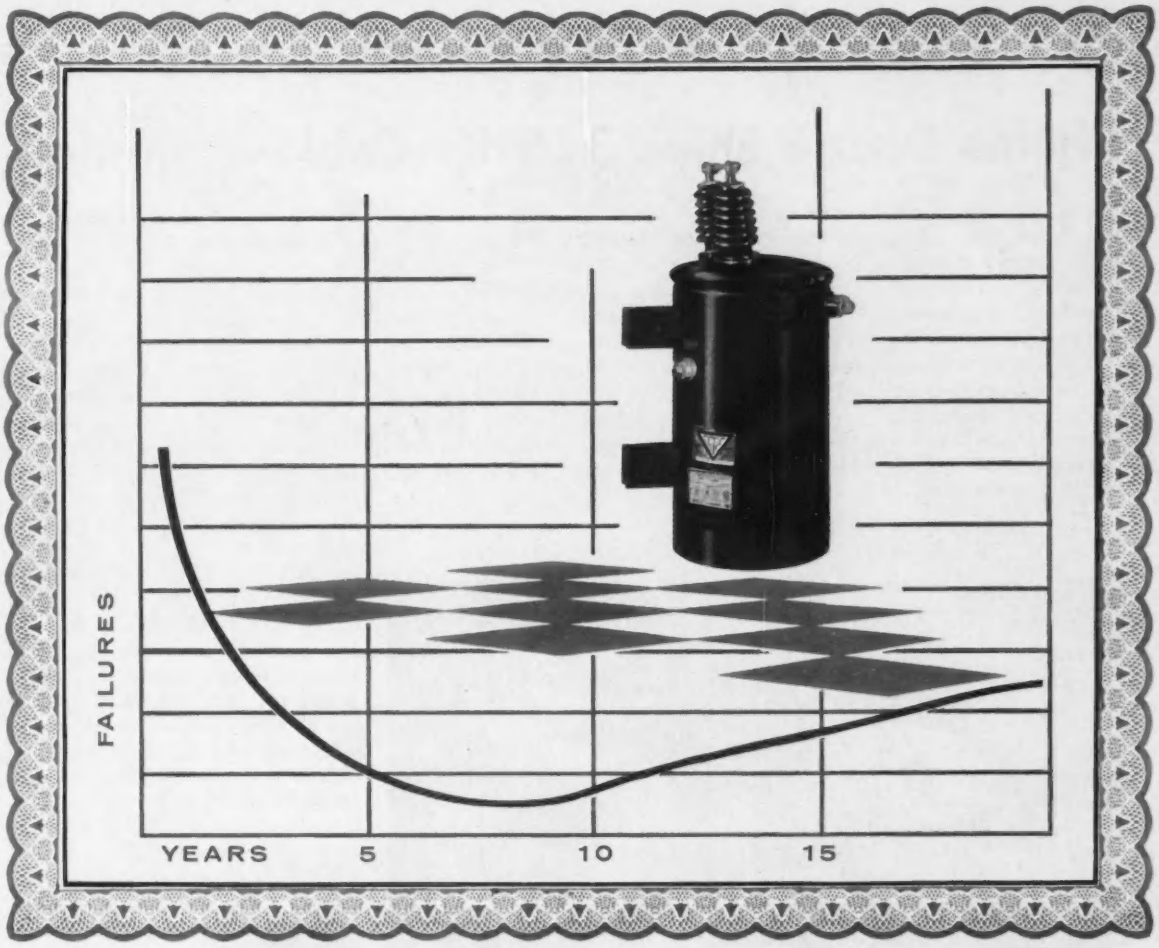
METALS OUTLOOK ▶ **Domestic copper prices for the year will average about 31¢** per lb predicts Engineering & Mining Journal, a McGraw-Hill publication. This compares with average producer prices last week of 33.815¢ a pound and merchants prices that are now ranging above 38¢. Even the experts have stopped trying to predict labor settlements in the copper industry, but they feel certain that lower prices in the latter part of the year will bring the average down to near the 31¢ figure for the year as a whole.

Aluminum pig prices are expected to remain fairly stable at around 26¢ a lb for the year. Main reason is that the industry appears to have plenty of capacity to meet requirements and additional capacity can be brought on the line in relatively short order.

Steel producers may decide to hold the price line through the year. If they manage that, a price increase would seem probable early next year.

FLY ASH ▶ **Sale of fly ash by Cleveland's Municipal Utilities Dept** is expected to bring in about $78,000 as compared to $10,000 last year. The ash, electrostatically collected, is sold to G. & H. W. Corson, Inc, of Philadelphia at 50¢ a ton for use as a cement filler.

News of Manufacturers ..... page 58
New Equipment ..... page 70
Readers Service ..... page 71



GUARANTEED

for 5 years — further proof of the exceptional quality built into every RT&E Transformer to save you money. The wisdom of this guarantee is borne out by the graph above. This typical mortality curve was developed from actual failure rates of one leading utility and covers all makes of transformers. It shows clearly that most transformer failures due to workmanship and materials occur during the first 5 years of use, the critical period covered by the RT&E guarantee.

In addition to this 5 year guarantee against defective materials and workmanship, RT&E also guarantees all fully protected transformers unconditionally for one full year.

RT&E CORPORATION

WAUKESHA, WISCONSIN
PORTLAND, OREGON

EE

Phelps Dodge Ships 345-Kv Cable to Cornell

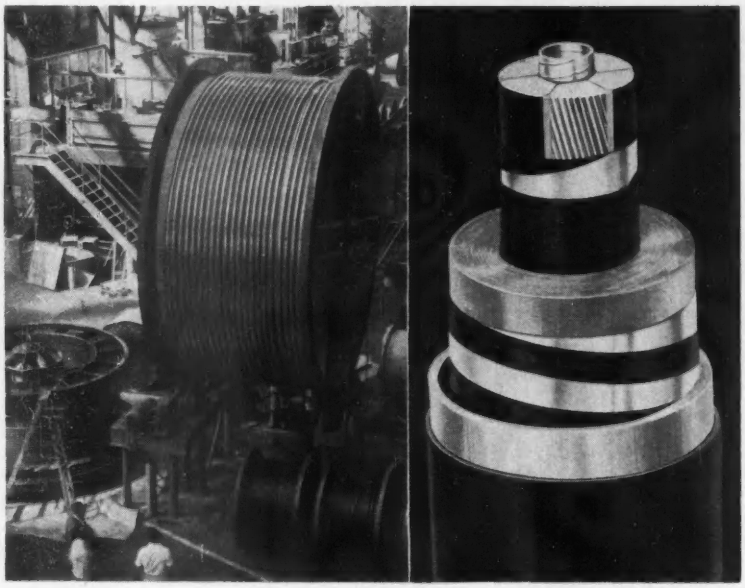
Phelps Dodge's contribution to the high-voltage cable field-testing program being conducted at Cornell University is a new 345-kv self-contained, high-pressure, oil-filled paper-cable system. It is pressurized at 200 psig by a pumping plant and spliced with mechanical joints.

The cable consists of a continuously-annealed six-segment compact-segmental copper conductor with 0.69-in. hollow core, 1 in. of graded insulation, 220-mil tubular aluminum sheath, and 115-mil black-pigmented, high-density polyethylene jacket. Full-scale prototypes were run on six-segment conductors up through 2,500 MCM, with plastic tape insulations as well as paper, both up to 1,250-mils thickness. Made with specially filtered water and with deionized water, papers were evaluated in densities from 0.65 to 1.2 and thickness from 0.8 to 7 mils.

High-voltage tests were made up to 680 kv (approximately 3½ times operating voltage) to ground 60-cycle and 1,300-kv impulse 1½ by 40 wave. Load-cycle tests were run on three separate 345-kv set-ups, up to six months, with conductor loading to an average copper temperature of 100C on the hot cycle. Two of these setups were run at a maximum voltage of 209 kv to ground. The third, which included a crepe-paper splice, was heat-cycled at 373 kv.

Due to the extremely high voltage, new types of high-pressure condenser potheads were developed by two accessory manufacturers in collaboration with PD engineers. Both G & W prototype 345-kv condenser potheads and G & W standard 230-kv potheads were employed in the load-cycle test programs. A full-scale 345-kv splice assembly, including cable trained to a five-ft offset and O-ring sealed mechanical joint sleeves, was subjected successfully to manhole bending for 100,000 one-minute cycles with a nominal 3-in. stroke. This test was pressurized with a mixture of freon and nitrogen to 200 psig, permitting continuous monitoring with a halogen leak detector.

Tools were developed to facilitate stripping of the aluminum sheath and the forming of manhole bends.



CABLE IS WOUND ON REEL (left) prior to shipment to Cornell for AEIC-EEI-manufacturers' cable-test program. Cutback view of the 345-kv cable (right)

IBM Has New Data System Ten Times Faster Than 705

International Business Machines Corp has developed IBM 7080, a data-processing system designed specifically for business with processing speeds up to ten times faster than the IBM 705 systems. IBM claims it is the most powerful computer yet designed, capable of producing management reports and processing payrolls, inventory control, billing and similar accounting jobs at a substantially lower job cost.

New design advances of the 7080 are: fastest memory available, called Communication Storage, which can transfer information at 1.09 μsec character rate, permitting five tape units to be read in or out simultaneously; a main magnetic core memory from which any of up to 160,000 characters can be called into the central processing unit in 2.18 μsec, and priority processing, a system which achieves maximum efficiency of simultaneous reading, writing and processing operations, and permits input/output devices to automatically control the flow of programs.

A unique, newly designed console includes a digital display of registers. Whereas formerly this information appeared on the systems' consoles in the form of binary-coded lights, it now is projected in back-lighted Arabic numbers for easy reading by the operator. The system has three modes of operation: 705 I and II, 705 III, and 7080.

(*Continued on page* 60)

REVERE Dual Gauge TUBE

of 80/20 Cupro-Nickel

used in A. O. Smith's feed water heaters in newest installation at Wisconsin's largest power plant

(Above) *Tubes being bent at JOHANN TUBE & PIPE BENDERS, Milwaukee, Wisconsin.*

(Below) *"A"—Oak Creek Plant of WISCONSIN ELECTRIC POWER COMPANY.*

"B"—Tube bundle before assembly.

"C"—Interior of channel showing tube sheet and pass plates.

The six A. O. Smith Feed Water Heaters recently installed in the #4 unit of the Oak Creek Plant of the Wisconsin Electric Power Company, represent the fourth such set serving the four units. Heaters are 24" in diameter with overall lengths up to about 23'. Operating pressures are 2400-2500 psi. Enclosure and channel tested out at 4800 psi.

To take the kind of bending necessary in this "U" type heater, and still maintain the required wall thickness throughout its entire length, the tube must be of the best quality and of the proper, uniform grain structure.

Revere Mills have the facilities to produce just such consistently uniform tube while Revere's Technical Advisory Service has the knowledge to recommend the metal or alloy best suited to the job it must perform.

Whether your requirements call for dual or single gauge tube, why not take advantage of the vast storehouse of facts made available as a result of extensive data which has been compiled over the years by Revere's Research Department? Start the ball rolling by getting in touch with Revere's Technical Advisory Service.

REVERE COPPER AND BRASS INCORPORATED

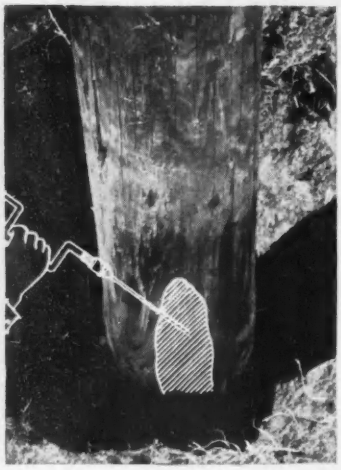
Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

COPPER * BRASS * 18 01 REVERE * ALUMINUM *

Treating
HOLLOW HEART
IS A SPECIAL ART



and OSMOSE
Has the "KNOW-HOW"!

Just a few years ago, decay in the interior of a pole at the groundline area was considered a pretty hopeless case. Today, Osmose is saving many thousands of these afflicted poles with its exclusive Hollow Heart Treatment.

After boring, a specially designed Shell Thickness Indicator is used to evaluate the remaining wood strength in relation to the load. If the pole can be saved, the OSMOSE Hollow Heart treatment is applied. This consists of literally flooding cavities with a highly concentrated solution of toxic OSMOSALTS suspended in water. Decay is stopped in its tracks. Your poles remain sound for years and years more of safe, money-saving service.

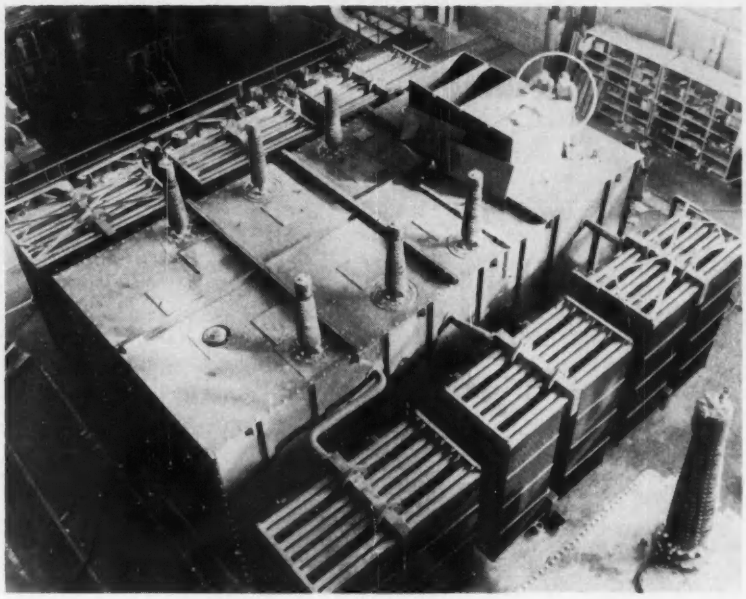
Discover the full story of the OSMOSE program for groundline inspection and treatment. Write Osmose Wood Preserving Co. of America, Inc., 991 Ellicott Street, Buffalo 9, N. Y.

Osmose®
SERVING UTILITIES SINCE 1935

New IBM Data System (*Continued from page 58*)

The 7080 is designed to accept 705 I and II programs and process them internally ten times faster and 705 III programs six times faster. The operator can establish any of the 705 modes by pushing a compatibility switch on the console. Major 705 programs which will operate on the 7080 system include Autocoder III, input/output package, decision making language, Fortran, report generator, file maintenance system, 705 Processor, and utility programs.

A typical 7080 system will sell for $2,528,000 or rent for $55,500 a month. This includes the central processing unit, magnetic core storage, console, two tape control units and 12 magnetic tape units. A basic system will sell for $2,233,000 or rent for $49,100 a month.



208-Mva Unit Has Aphonic Enclosure

General Electric workmen (circled, above) complete assembly of 208-Mva, 417-ton phase-shifting transformer which is bound for Consolidated Edison Co's Hudson Ave station, Brooklyn, N. Y. It is the highest rated transformer equipped with a sound-absorbing, aphonic enclosure, says GE.

The unit achieves a sound level 23 db below normal for transformers with a similar rating by using the aphonic enclosure or "hood" lined with sound-muffling, fibre-glass batts.

Epoxy-Mica Insulation Used for Large AC Motors

Motor Coils Mfg Co, Pittsburgh, announces that its Epoxi-Mica insulation system is now being applied to large ac motors. Chief advantages the company cites for this type insulation of these motors are complete vacuum-pressure impregnation of mica splittings with solventless epoxy resin; flexible coils suitable for easy field rewinding; and greatly improved electrical, mechanical, and thermal properties.

Highest resistance under the worst oil, water, and dirt conditions is claimed by Motor Coils for the insulation, as well as increased heat transfer. Coils are sealed on the outside to prevent leakage and the resin is not cured before winding.

Ratio of Capacitor Kvar To Peak Kw Remains .40

During 1959, the ratio of installed capacitor kilovars to peak load kilowatts in the U. S. remained unchanged at .40, according to General Electric's manager of power capacitor sales, W. G. Hart.

According to Hart, this indicates that capacitor usage during that period merely kept even with the increase in peak load kilowatts. However, the historic trend to higher ratios is expected to resume in 1960, he says.

He also pointed out that lower capacitor prices and the introduction of smaller, lighter units and equipment have combined to achieve a significant reduction in the cost of installed kilovars. Hart indicated that because of price, weight, and size savings, such as have recently been demonstrated by GE's new 82-lb 50-kvar capacitor, a considerably higher kvar to kw ratio can be justified.

Capacitor unit prices have been reduced from $4.50 per kvar in 1950 to the present price of $2.39. In turn, the company estimates that installed costs are now as low as $3.00 per kvar for fixed equipment and $4.00 for the switched types.

Due to considerable increase in cost of alternate sources of kilovars, Hart estimated that one kilovar installed for each two peak kilowatts is the justified average ratio for the electric utility industry. This is based on the relationship of today's capacitor prices to the cost of alternate sources of kilovars.

First Aluminum Structures For EHV Shipped by Alcoa

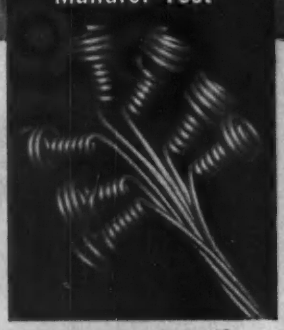
Aluminum Co of America has made first shipment of aluminum members which, when assembled, will comprise the north substation of General Electric's Project EHV, being constructed in western Mass.

The substation will be flanked by two portal-type aluminum tower structures which are large inverted U shapes. The towers, 42-ft-wide, are lattice-type assemblies of aluminum structural angles joined with aluminum bolts. Virtually all materials used in the substation and the fence around it are aluminum.

(*More Procurement & Products, p* 70)

STEEL STRAND

Mandrel Test*



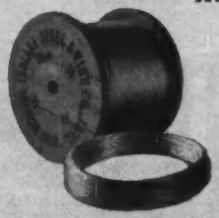
Checked and Double-Checked by Laboratory Technicians

Every coil of wire used in the manufacture of *Crapo* Galvanized Steel Strand is tested and approved by trained laboratory technicians. Samples from both ends of each individual coil are subjected to a series of prescribed tests before stranding. Then, the finished strand is re-checked to make certain that it conforms in every respect to established specifications and our own high quality standards.

Thus you know when you specify *Crapo* Galvanized Strand that every precaution has been taken to assure maximum performance in the finished product.

Write for Free Booklet

"The Story Behind Crapo Galvanized Wire and Strand" illustrating and describing manufacturing techniques and testing procedures. Ask for Booklet B-59!



AVAILABLE IN 3 COATING WEIGHTS

FOR GUYS, MESSENGER AND OVERHEAD-GROUND WIRE

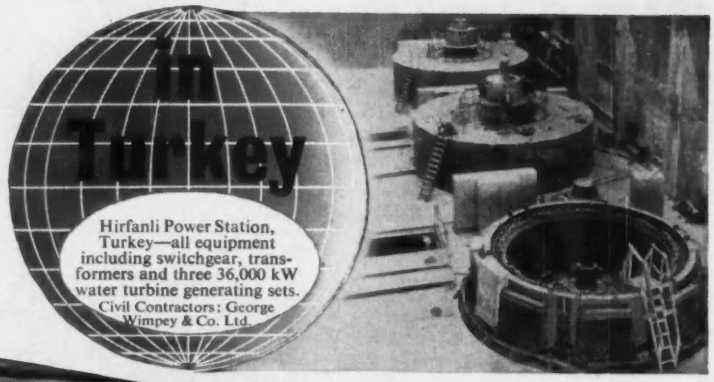
Crapo Steel Strand is available in all standard sizes and grades and in Class A, B and C galvanized coatings. Class B coating is twice as heavy as Class A coating; Class C coating is three times as heavy.

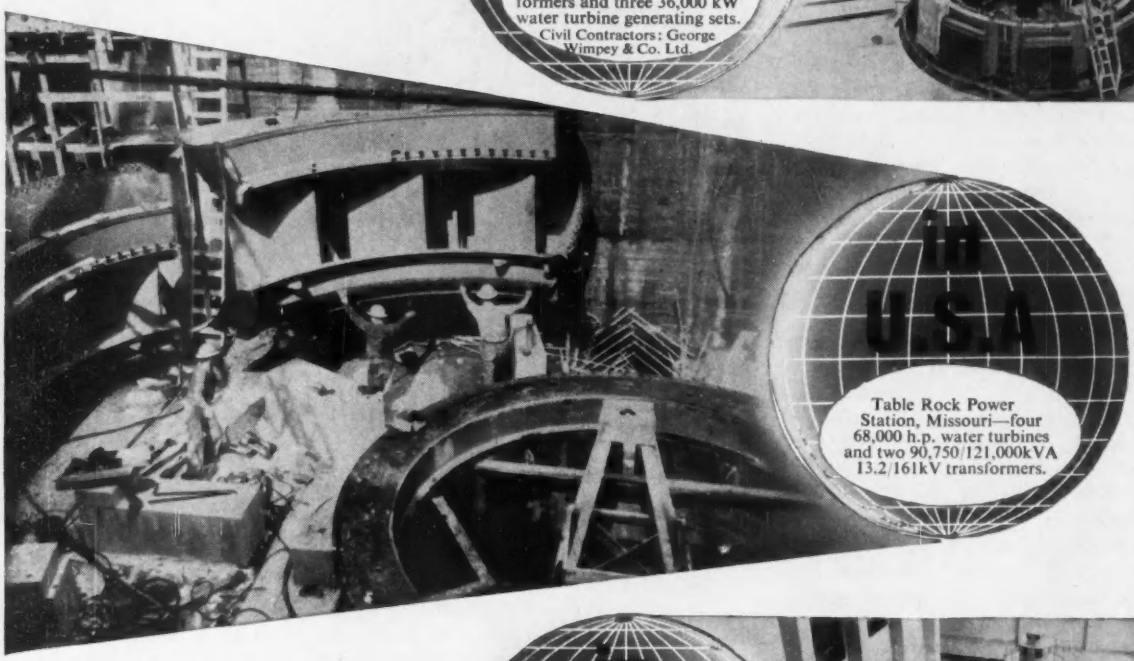
*Determines ductility of wire and adherent quality of galvanizing.

INDIANA STEEL & WIRE CO., INC.
Muncie, Indiana

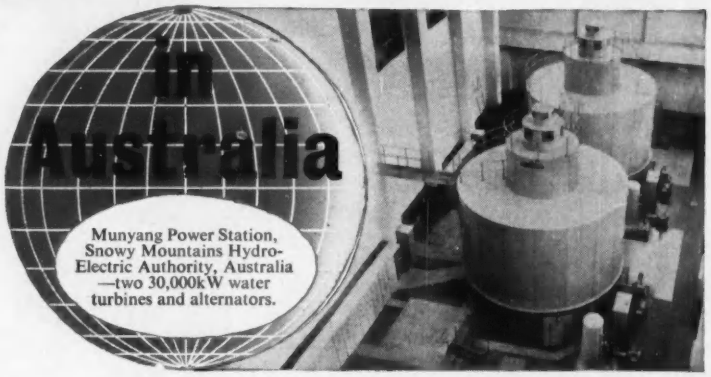
Helping to generate the world's power

'ENGLISH ELECTRIC' water turbines and generators are meeting the power requirements of many countries throughout the world. At three major schemes in the United States, 'ENGLISH ELECTRIC' hydro-electric equipment will be adding some 1,630,000 h.p. to America's power potential.


in Turkey
Hirfanli Power Station, Turkey—all equipment including switchgear, transformers and three 36,000 kW water turbine generating sets. Civil Contractors: George Wimpey & Co. Ltd.



'ENGLISH ELECTRIC' products cover all aspects of the generation, transmission and utilization of electric power. Contracts have been completed and are in hand for many other major American power projects.


in Australia
Munyang Power Station, Snowy Mountains Hydro-Electric Authority, Australia —two 30,000kW water turbines and alternators.

'ENGLISH ELECTRIC'

Agents: ENGLISH ELECTRIC EXPORT & TRADING CO. LTD., 750 THIRD AVENUE, NEW YORK 17, N.Y. Tel: MURRAY HILL 7-0303

Sub Agents:—

James I. Metcalf & Co. Inc., Room 704, 1411 Fourth Avenue Building, Seattle 4, Washington. Branch offices in San Francisco, Los Angeles, Portland, Phoenix, for Alaska, Arizona, California, Idaho, Montana, Nebraska, Nevada, Oregon, Utah, Washington and Wyoming.

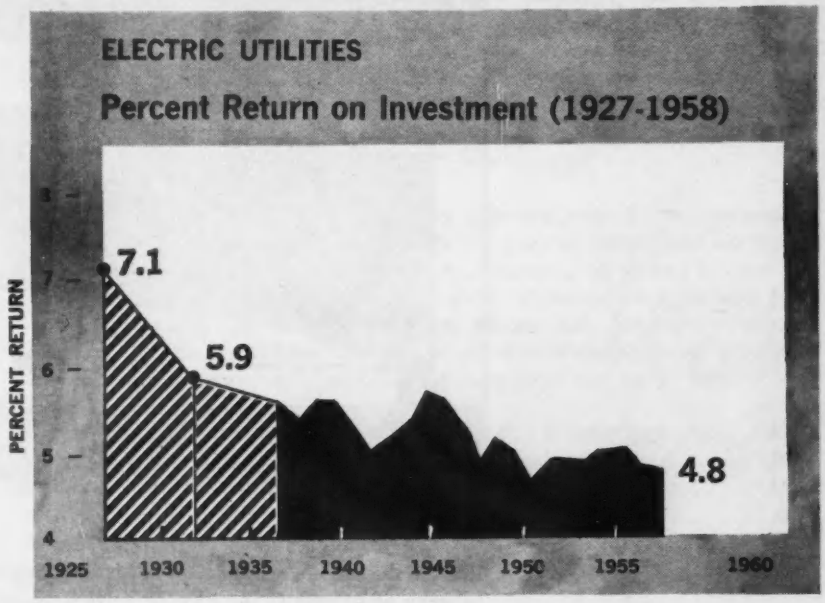
Osgood and Associates Inc., 988 Spring St., N.W., P.O. Box 7383, Station C, Atlanta 9, Ga., for Alabama, Florida, Georgia, Kentucky, South California and Tennessee.

Electron Equipment Co. Inc., 2418 Calhoun St., New Orleans 18, La., for Louisiana and Mississippi.

Peabody Bros., 2903 St. Louis St. at Oakland, Dallas 26, Texas. Branch offices in Houston and Tulsa, for Arkansas, New Mexico, Oklahoma and Texas.

SERVICE FACILITIES ARE AVAILABLE THROUGH THREE LARGE CANADIAN PLANTS

OC/US/3



Report on
Selling

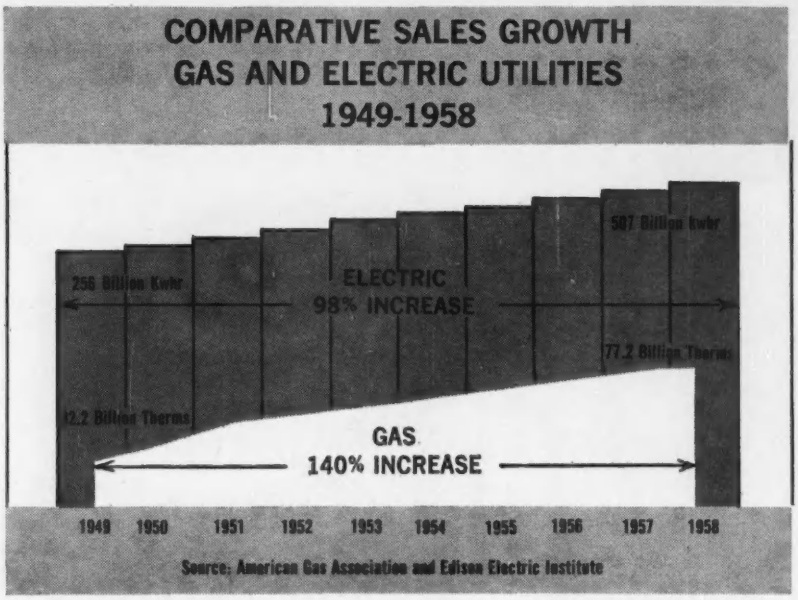
Correct . . . and Capitalize!

Want the facts on what may be the hottest new selling idea in the industry? Then keep a close watch on the progress of a visionary new wiring plan: Correct and capitalize. It's a plan to unhobble residential kilowatt sales by curing the very ill that keeps merchants from selling more heavy electrical appliances—A house that's not wired-up for "electric living." But it isn't just a wiring assistance plan. With correct and capitalize you beef up home wiring as before. But then you capitalize the investment right into your rate base. Your distribution lines don't stop out on the street, they run right up to and include your customer's service entrance, and maybe even more.

The payoff estimates look like this. (1) System load factors—increased, especially for the growing ranks of summer peak companies. (2) Major appliance sales—a vigorous upturn, running 100% or more above current sales volume. (3) Rate of return for the additional investment—perhaps 3% to 4.6% the first year. In ten years, 7.4% to 8.6%. All this was set forth succinctly by Malcom R. Rodger, vp-sales for Middle West Service Co, in a speech in Louisville in December. His talk: "Correct and Capitalize Equals Profitability."

Why steer this new course? It's painfully evident in the chart above. Rates of return have been heading downhill for years. In 1927, for example, the industry was whistling a merry tune. It earned a 7.1% return on invested dollars. But by 1958 over one-third of that profit margin had been pared off—the rate of return had dipped to 4.8% for the industry as a whole. Suppose that '58 figure had touched the 6% mark? If it had, Rodger pointed out, electric company profits would have been swelled by some $471 million in extra earnings.

The service entrance bottleneck is one of the greatest single barriers to soaring increases in residential kwhr sales, Roger pointed out. That's a fact the gas industry has been quick to exploit. "No costly wiring is needed" with a gas-fired furnace or water heater—a point not brushed aside lightly by appliance buyers. Gas, furthermore, shows every sign of competing aggressively in the future.



Look at the way the gas industry has been galloping along. Gas sales rose 140% between 1949 and 1958. Electric sales have grown fast too, but marched up only 98% over the same period. Moreover, gas has expanded its plant investment during this period at a rate twice that of the electric industry.

How much of these gas sales could have been electric? "The electrical industry has lost more load to gas than anyone will ever realize because of inadequate wiring," Rodger averred. One obvious solution to this dilemma is to correct and capitalize the customers' service entrance.

Bigger kwhr sales, of course, are no cure-all for slipping rates of return. System load factors, too, must improve. This is a woe the southern power companies have had to contend with as heavy new air conditioning loads have taken their toll in depressed load factors. For example, the south-central utilities have seen their load factors drop from 60.6% to 56.6% between 1952 and 1958.

Southern load factors will continue to decline, EEI predicts, probably to 55.1% by 1962. On the other hand, total US load factor, which in 1958 stood at 64.5%, should improve to 65.4% by 1962, EEI says.

But the whole industry will eventually follow this declining pattern of the southern utilities, Rodger believes. As the heavy cooling loads move northward more companies will switch to summer peaks. At first, there will be a short term trend in load factor improvement as more air conditioners are switched onto northern lines. But as soon as the cooling loads over-balance other daytime loads, he predicts, system load factors will fall in the north as well.

The impact of air conditioning was clearly shown by a system peak survey that Middle West ran in 1958. The companies that participated represented 89% of all electric customers and 98% of total industry peak capacity. The final tally showed that, by 1965, utilities in 31 states expect a summer peak. These systems serve 82% of all electric customers. Furthermore, this shift to summer peaks is changing at a faster rate than a 1955 survey had indicated, Rodger said. And it now looks like even more companies will have summer peaks than the more recent survey showed. All of this means that it is going to take more effort to improve rates of return and system load factors in the years ahead.

And that is just where correct and capitalize comes into the picture. The load factors and rates of return earned by the high use appliances, based on their demand at the time of the system peak, are greatly improved under summer peak conditions. With an afternoon system peak, usually at 3 pm of the hottest summer day, practically all lighting and appliances (except cooling loads) will be off-peak. For example, annual load factor for dryers, based on a summer daytime demand, is 50%. For ranges it is 90%. For combination refrigerator-freezers, 84%. And for water heaters, 69%. Summer peak companies, Rodger said, need more of these loads to compensate for air conditioning load factors of 10%.

The percent return an appliance can earn on a summer peak system is impressive. The earnings on an electric range, for instance, improve vastly when a company goes from a winter to a summer peak. On a winter peak system a range will earn from 4.2% to 8.9%. But put the same appliance on a summer peak system and it earns an 18% rate of return, Rodger said. Here are other rates of return he presented, based on the incremental investment and expense a summer peak company would make to put these appliances on its lines:

• Television sets	27%	• Lighting & miscellaneous	17%
• Refrig. (100-150 lb. freezer)	19%	• Refrigerators (old style)	16%
• Ranges	18%	• Clothes dryers	14%
• Home freezers	18%	• Water heaters	13%
• Refrig. (30-70 lb. freezer)	18%	• Heat pumps	7%
• Dishwashers	17%	• Room air conditioners	3%

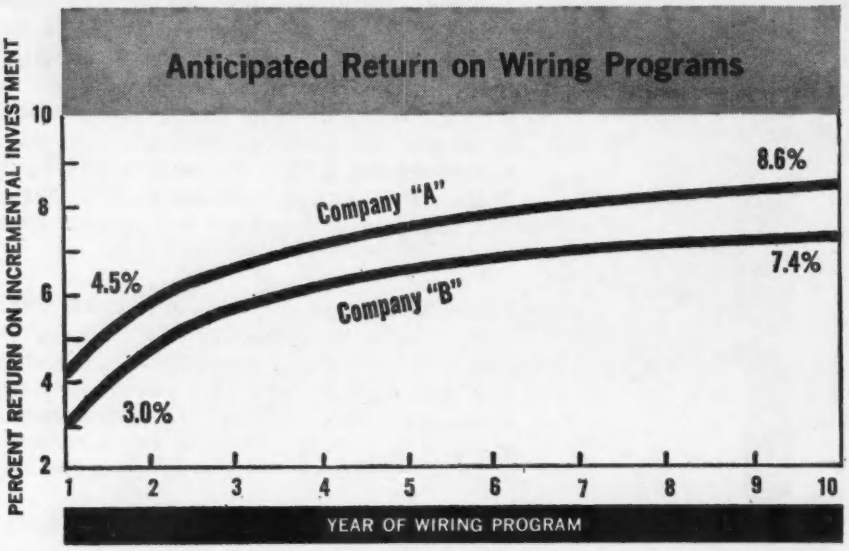
The aggressive sale and promotion of the high percent return appliances is one way to boost load factors and rates of return. How, then, can a utility help sell more of these appliances? To answer that question Middle West has surveyed the dealers themselves.

Wiring installation allowances ranked either first or second in four of its most recent dealer surveys. The dealers mentioned other sales aids—salesmen's bonuses, company campaigns and home service assistance. But wiring itself led the field. This kind of assistance is already widespread. In fact, a General Electric Co survey showed that 42% of 59 utilities polled now provide the entire service entrance, or a portion of it, to help increase appliance sales. And 32% of the companies were planning or examining possible changes in their service entrance policies. Capitalizing the service entrance is just one step beyond this already widespread practice.

Overall costs of a wiring program, according to Rodger, should run about $2.50 to $3.00 per year per customer for free installation of service entrance equipment. But this investment should pay for itself in new revenues. And if a second or third major appliance is added, this works out to about $1 of cost for each $1 of added revenue.

How have wiring programs paid off in actual practice? There are two ways to judge. The first is the increase in new business on residential lines. The second —and more important—is the percent return on the cash tied up in the program. Here's how appliance sales jumped for four utilities that started a wiring program. Company "A": electric range sales increased 211%, dryer sales 101%. Company "B": range sales increased 103%, dryer sales 203%. But two other companies did not fare as well. Company "C" increased range sales only 21% and water heater sales just 28%. And company "D", a combination electric-gas company, increased appliance sales only 17% in the areas where the program was in effect.

Rodger purposely picked two companies with outstanding results and two others that made only a mediocre showing. Companies "C" and "D" did not



sell their wiring campaigns aggressively enough. A wiring program will not sell itself, he affirmed. It takes strong promotion to make it work.

Here are the rates of return that two companies expect from a correct and capitalize program. Both have thoroughly studied the economic potential of owning residential facilities up to and including an outside service entrance panel. Both have material differences in winter and summer peaks, and probably represent a good range of the returns that other utilities might expect. The rates of return are charted on this page. The added revenues include only those from homes that need a new electrical service entrance. The investments are all-inclusive. They include the costs of production, distribution and transmission facilities to serve the new loads, as well as the expense of owning the service entrance itself.

The results are interesting indeed. Company "A" predicts it will earn a 4.5% return the first year of the program, almost 6% within two years, and by the tenth year, a return of 8.6%. For company "B" the results are almost as good. It expects its service entrances to earn 3% the first year, 5% within two years, and 7.4% in the tenth year of the program.

Just how far can an idea like this go? As a matter of fact, utility and investment people are already thinking beyond the service entrance. P. P. Stathas, president of Duff & Phelps, utility financial consultants, had this to say before the Richmond chapter of the National Association of Accountants: Utilities should consider expanding their service to include "at least some major appliances as part of their service and to have such equipment included in their rate bases." "This may be visionary," he said, "but the time will come when, through such steps, utilities will be able to increase their earnings and at the same time make a desirable contribution to improving peoples' standards of living." Like the telephone companies, electric utilities may someday supply service right to the point of use.

Correct and capitalize is past the theory stage. It's already in practice by Georgia Power Co (EW Jan. 4, p 51) and has the okay of the Georgia Public Service Commission. The company can capitalize from $50 to $200 of each service entry facility into its rate base, depending on the type of installation it makes. To cover the costs, $4.5 million has been added to Georgia Power's 1960 operating budget. Earned added revenue from the program for the first year is projected at about $1.4 million.

Why use tower bolts with half the corrosion-resistance of the structural members?

Bethlehem galvanized tower bolts last longer because their average coating more nearly equals the coating on the tower members. Here's the story:

1. Galvanizing protects against corrosion in direct proportion to the coating weight.

2. Tower structural members are galvanized to specifications requiring a minimum protective coating of 2.00 oz per sq ft.

3. Ordinary Tower bolts and nuts have a minimum protective coating of 1.00 oz per sq ft with an average of 1.25 oz per sq ft.

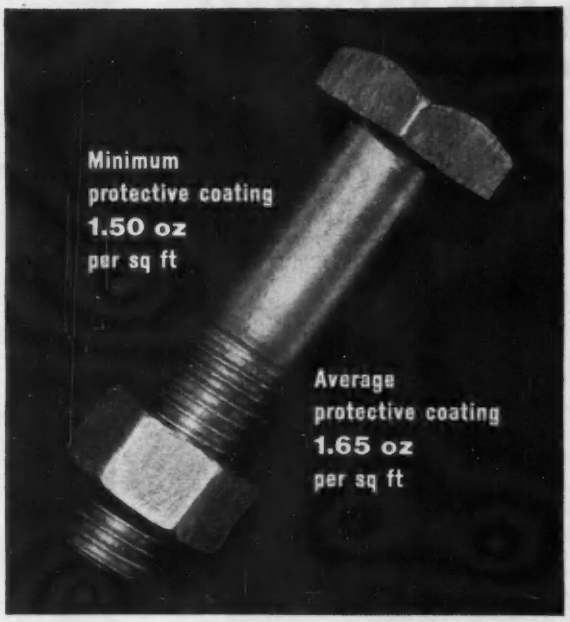
4. Bethlehem has developed a galvanizing method producing a minimum of 1.50 oz per sq ft (average is 1.65 oz per sq ft).

You can count on Bethlehem tower bolts and nuts to have a longer lifetime. Our nearest sales office will gladly give you full details.

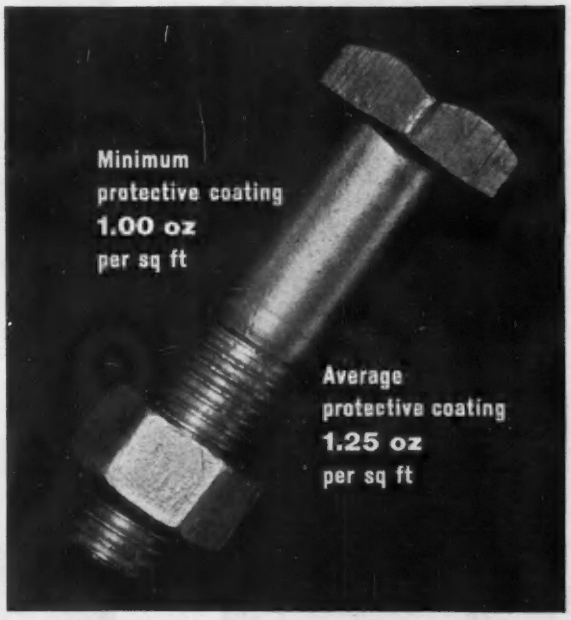
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL



BETHLEHEM has developed a method of galvanizing tower bolts and nuts that results in a heavier weight of coating.

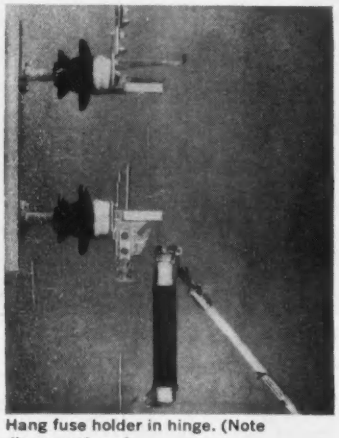


ORDINARY tower bolts have the weight of galvanized coating shown above.

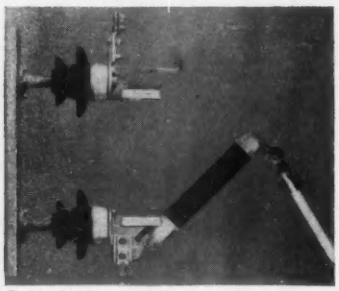
LOW-COST SWITCHING

HOW THE SM-4 SWITCHES

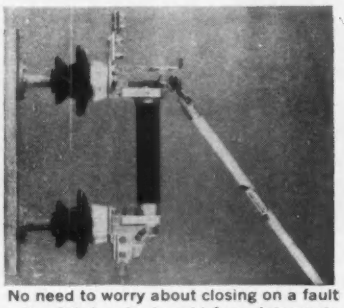
Photo at right shows the fuse being opened with Loadbuster. Photos below show closing sequence with conventional handling tool.



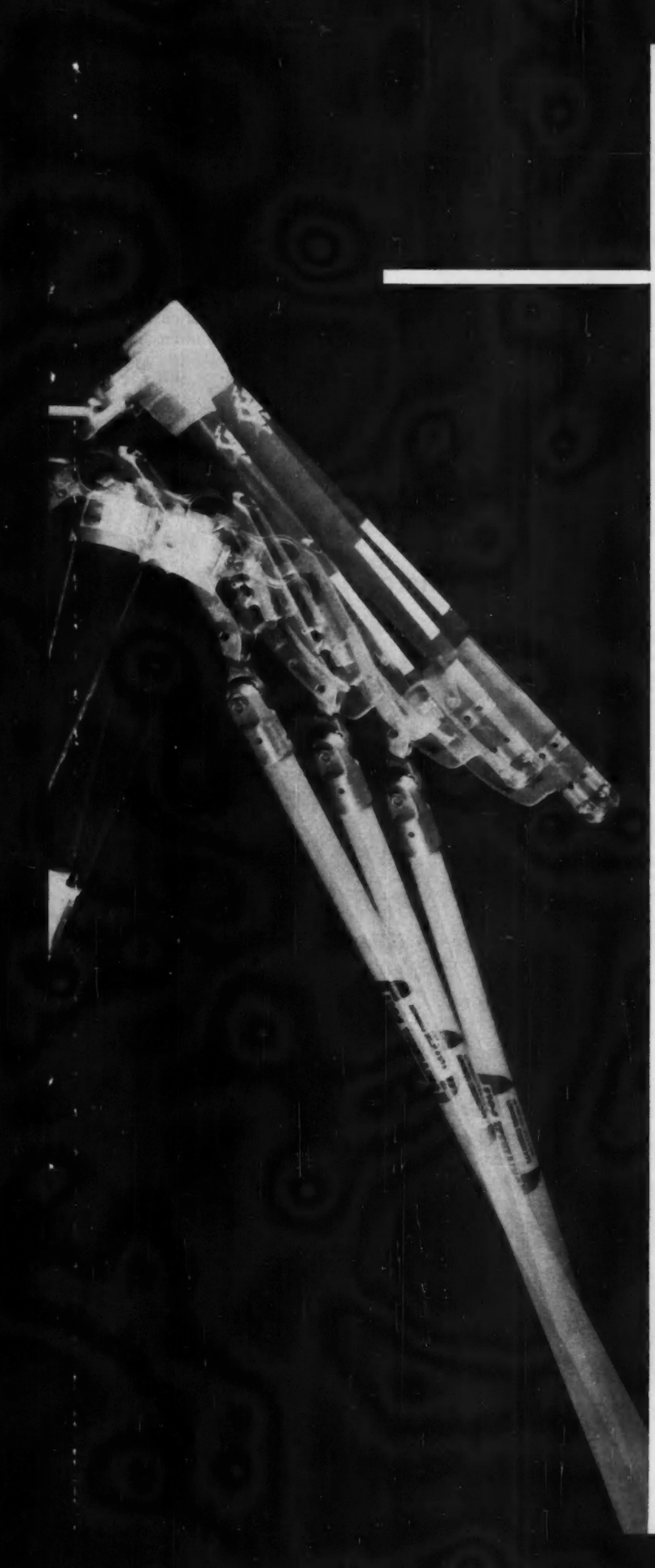
Hang fuse holder in hinge. (Note disconnect gap) . . .



Swing holder closed . . .



No need to worry about closing on a fault —the SM-4, a boric acid fuse, interrupts effortlessly.



Now even power fuses operate with S&C's Loadbuster® — no need to add a disconnect

That's right . . . no disconnect required! If it's S&C's outdoor SM-4 Power Fuse, you switch with the fuse itself—plus Loadbuster.

On transformer primaries there's no separate investment in disconnects for energizing, or for de-energizing and isolating. For line sectionalizing the same holds true—and then some! With Loadbuster it's possible to drop the line, split the load, even dump the load—up to 14.4 kv.

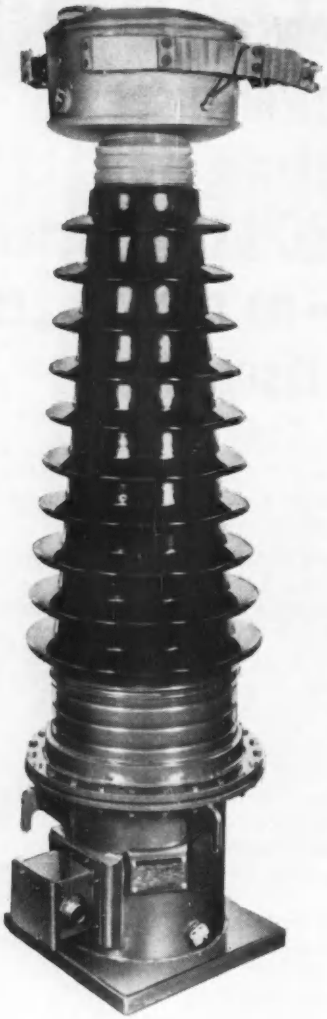
Here's how it works. The SM-4 Power Fuse is equipped with an attachment hook to accommodate Loadbuster. Just hook Loadbuster onto this hook and into the pull ring, pull fuse open and the circuit is interrupted. Result: full load switching at full voltage with no arcing, no contact burning. In one device you get full switching and isolation as well as fault protection.

The key to the Loadbuster system of universal, low cost load switching? Portability! . . . bringing the interrupting device to the power fuse, disconnect, or cutout only when it's needed. In this way the cost of Loadbuster is spread over all the fuses, disconnects, and cutouts on the distribution system.

For more information contact S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Ill. We will be glad to give you a demonstration of how Loadbuster works.

S&C ELECTRIC COMPANY

S&C

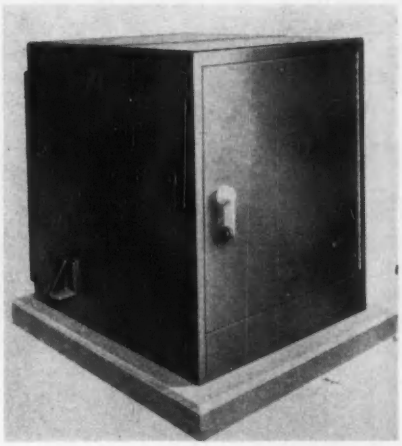


HV Current Transformer . . .

. . . features ease and low cost in handling and installation. Available in voltage classes of 115 kv (550 kv BIL) and above, with dual current ratios of 10/20 to 1,500/3,000 amp, the unit (Type ACT) is shorter and lighter than its predecessor. Mounting dimensions are 17 x 17 in. The 550-kv BIL unit measures 86 in. from base to bushing top and weighs 1,100 lb. The transformer uses the "solid insulation" principle.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

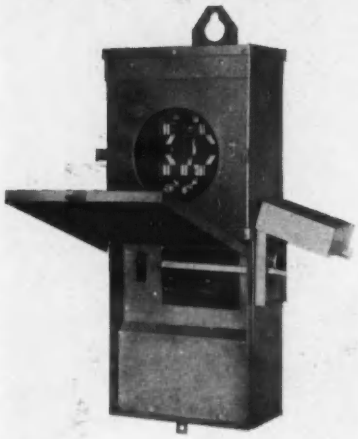
Pad-Mounted Transformers . . .

. . . are designed for surface mounting on a concrete pad, through which the primary and secondary cables are brought into a tamper-proof enclosure for connection to terminals. The Sub-Urban units, easily adapted to handle load growth, are built in single-phase ratings 25 through 167 kva, and three-phase ratings 75 through 500 kva, 15 kv and below.
Wagner Electric Corp, 6400 Plymouth Ave, St. Louis 14, Mo.



Motor Control Centers . . .

. . . with bus capacity from 200 to 2,000 amp for voltages from 110 to 600 v are available as fusible or circuit breaker combination units. The control centers, with two or more starters fed from a common bus, are often attached to transformers or switchgear to form a unit substation. These units use up to 33% less floor space and have lower engineering and installation cost.
Allis-Chalmers Mfg Co, Milwaukee 1, Wis.



Meter Entrance . . .

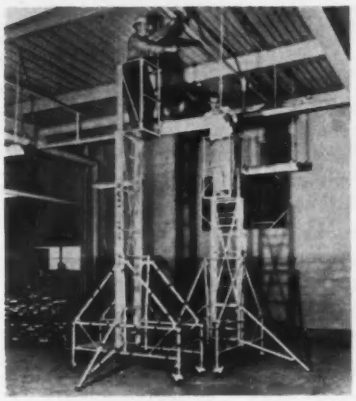
. . . for pole-top mounting provides a 200-amp circuit breaker entrance service for use with underground secondary systems. The Hi-Liner Series UMB-200 cabinet contains a 200-amp meter socket, 200-amp circuit breakers with overcurrent protection, a secondary wiring trough and terminal strip in a pre-wired package. For areas where power use may be below the 200-amp range, breakers may be supplied in dual ratings of 30, 40, 60, 80, 100, 140 and 180 amp.

Hi Products, Inc, 7700 Wentworth Ave, South, Minneapolis 23, Minn.

Telescoping Scaffolds . . .

. . . that fold down to roll through doorways and are adjustable for heights up to 31 ft are now available. Made of aluminum, each scaffold is 29 in. wide and can easily be assembled by one man. The scaffolds are used for fastening motors to frames, conveyors to ceilings and for installing conduits, piping, ducts and supports for equipment.

Up-Right Scaffolds, 1013 Pardee, Berkeley, Calif.



Radiation Pyrometer . . .

. . . is low range system for recording temperature of cable insulation, liquid process flows, or any unpolished solid. Standard range is 0-400F, with ranges to 1,100F available. Bristol Velotron Model 9E6 includes a pyrometer and a Dynamaster recorder or recorder-controller. Ambient compensation is automatic; unit can be used in ambients up to 135F. Electrical span of instrument can be matched to emissivity of target.

The Bristol Co, 113 Bristol Rd, Waterbury, Conn.

Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below:

NEW EQUIPMENT

Westinghouse .....Transformer ☐
Wagner ...Mounted Transformer ☐
Allis-Chalmers ...Motor Controller ☐
Hi Products.....Meter Entrance ☐
Up-Right .....Scaffold ☐
Bristol .....Pyrometer ☐

OTHER

_____

_____

Manufacturers Editor
Electrical World
330 W. 42nd St.
New York 36, N.Y.

* **Note: Requests must be received within four weeks of publication date, accompanied by complete information specified. This service cannot be offered to readers in foreign countries or to competitive manufacturers.**

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TITLE_____
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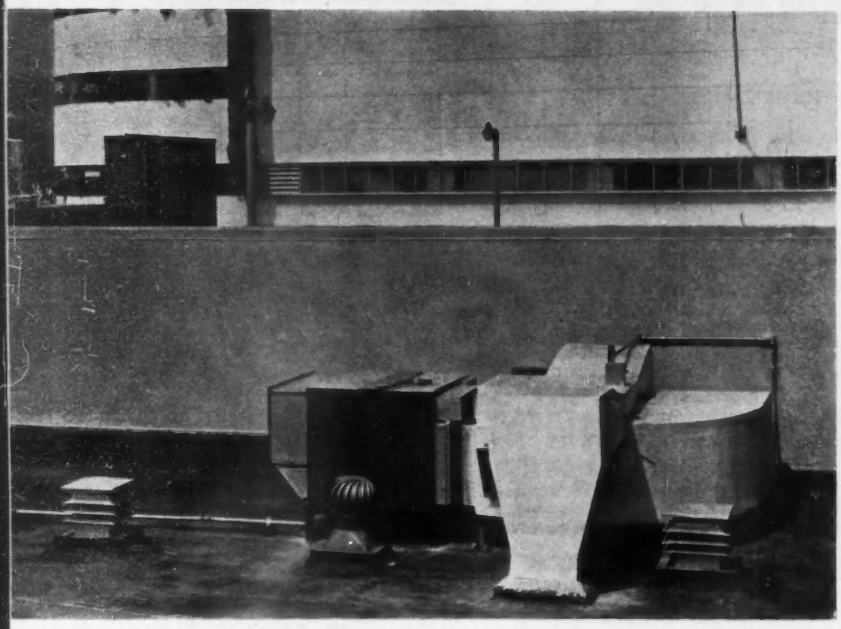
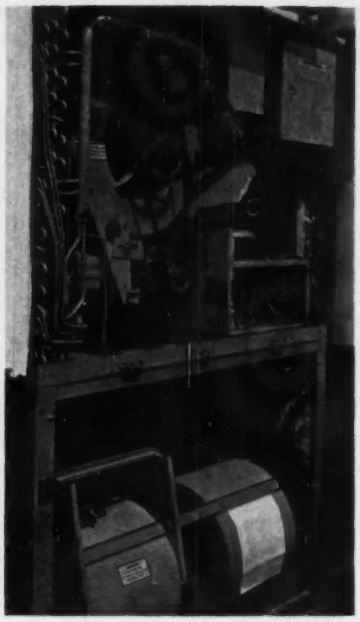
COMPANY_____
ADDRESS_____

FOR:
Reference ..... ☐
Specs ..... ☐
Trial ..... ☐
Purchase ..... ☐

FEBRUARY 8, 1960



SINGLE-UNIT HEAT PUMPS take care of heating and cooling the kitchen, classroom, and home economist's office in the Electrical Living Center



THREE FIVE-TON UNITS provide for 200-seat auditorium

Utility Office is Showcase for Heat Pumps

HOWARD P. GLUCKMAN and **CALVIN SINGMAN,** L. A. Department of Water & Power, Los Angeles, Calif.

Three different heat pump systems are being demonstrated to prospective purchasers at the new Crenshaw Commercial Office and Electrical Living Center of the Los Angeles Department of Water & Power. The heat pump systems are in operation and serve to provide heating and cooling for the building. The systems are separately metered so that data on cost of operation can be given to interested prospects. Architects and engineers indicate they will be interested in having this information.

A multizone built-up system provides heating, cooling, and ventilation for five separate zones including the main lobby and customer service areas, display areas, and clerical offices. The major components are a 20-ton compressor, a 7,000 cfm multizone indoor air handling unit, an outdoor heat exchanger, modulating air dampers, and a control system with individual control for each zone. If a zone requires cooling when the system is heating, by-pass air is furnished to this zone until the heating demand elsewhere is satisfied.

The Electrical Living Center is comprised of an auditorium with two stages; one for domestic appliance and cooking demonstrations, the other for commercial demonstrations, a domestic preparation kitchen, home economists' offices, and a classroom.

The auditorium heat pump installation consists of three 5-ton package units operating together to provide 15 tons of capacity. A two-stage thermostat provides control for heating and cooling. Two 5-ton units are switched on for the first stage and the remaining unit for the second stage.

The third system is made up of 1-ton and 3-ton individual package units for the kitchen, classroom, and senior home economist's office.

Since the systems have not been in operation through a complete heating and cooling season, operating cost and maintenance data are not yet available. However, our sales people plan to make full use of these facilities for demonstration after the data have been collected.

House Heating Show Scheduled

The first National Electric House Heating Exposition will be held in Chicago's Sherman Hotel, March 21-23. The Exposition will be sponsored by the Electric House Heating Equipment Section of the National Electrical Manufacturers Assn.

A symposium will be conducted in connection with the show. Key posts on the program will be shared by leading manufacturers, power suppliers, electrical distributors and contractors, bankers, architects, builders and Underwriters' Laboratories representatives.

Subjects to be discussed include: new insulation techniques, heat losses, electric heating promotions, interpretations of the National Electrical Code of electric heating instal-

(*Continued on page* 74)

Sparking the electric industry...

What an industry a little spark started! Growing yearly by leaps and bounds, the electric industry's projected sales for 1960 are 681 billion kwhr—an increase of 142% in the last decade!

To maintain this giant industry has required enormous resources of building, maintenance, planning. And Ebasco has worked hand in hand with industry in each of these areas to help meet the increasing demand for electric power.

Ebasco personnel is trained, experienced and has the know-how to help the electrical industry in 16 specific areas—from plant site selection, to building, to automated plant operation, to methods improvement programs.

In the electric field, as in a wide variety of industry, the first step in building, expanding, modernizing, in securing technical service of any kind—is to consult Ebasco.

Our booklet—"The Inside Story of Outside Help"—describes Ebasco's services and how they may be of use to you. For a copy, write Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.

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lations, and unit heaters versus central systems.

The Exposition is open only to representatives of the trade. Stanley B. Aronson, sales manager, Berko Electric Manufacturing Corp, is general chairman.

Low-Use Customers

Research on the development of the low-use customer is greatly needed, according to Charles J. Sinnott, general sales manager, New Orleans Public Service Inc. First find out what makes him a low user, he said. It is not always synonymous with low income. Second, research should be initiated to show how to upgrade the low-use customer in stages so as not to overburden him financially. Third, have more knowledge of what it takes to sell him increased usage.

Hotpoint Institutes Own Medallion Home Program

Hotpoint Co has instituted its Medallion Home Program for 1960, designed to back up on the local level the efforts of the electrical industry's Live Better Electrically Program, key feature of which is the Medallion Home.

The program is an 8-point plan to help sell Medallion Homes.

It will offer:

1. Benefits of electric baseboard heating.

2. Honor Home Merit Award to those builders who do an outstanding job in selling products for the all-electric home.

3. National advertising, newspaper advertising, model-home display materials, and hand-out brochures.

4. Kitchen planning service, including floor plan, perspective rendering, and material samples for kitchens in all-electric homes.

5. Training films.

6. Publicity aids such as news releases and displays of the company's Custom Trend appliances.

7. Supplier support by coordinating trade allies.

8. Hawaiian holiday awards to builders in each sales region who do the best merchandising job on the company's Medallion Home Program.

SELLING BRIEFS

Pennsylvania Power & Light Co is going into aggressive promotion of **electric heating** for homes. Annual use where installations have already been made averages about 25,300 kwhr. This compares with 3,175 per residential customer without electric heating. Three hundred and twenty-three home installations have already been made in the company's service area, and another 350 have been specified for new homes—all before the company made its first public announcement on electric heating advantages.

Brighter street lights have been requested in the town of Poughkeepsie, N. Y., by several councilmen. They complained it was tough finding their way during door-to-door canvassing of voters on dark nights just before election.

Tampa Electric Co has added 626 **Medallion Homes**—191 Gold and 435 Bronze—since its program was inaugurated in June, 1958.

North Carolina Fire Rating Bureau has proposed $50 deductible for policies insuring appliances against **lightning damage.** Decision will be reached later.

Air purifier for odor removal, winter dehumidification and constant air cleansing has been developed by Carrier Corp. Company says it will make possible continuous 12-month control of the quality, humidity and purity of indoor air as well as its temperature. Unit will be marketed in spring for installation with new central air conditioning systems in homes and smaller commercial establishments, as well as an addition to existing systems. Larger models for big air conditioning systems will be ready in the summer.

Homemaking center for evaluation of new products has been opened by Parents' Magazine at its New York headquarters. Products and equipment undergoing study include: ranges, dishwashers, portable electric appliances, washers, dryers, ironers and vacuum cleaners.

Transformer type **pipe thawing unit** has been developed. A 15-ft length of ¾-in. galvanized water pipe in a milk house was thawed in four minutes, the manufacturer, Hobart Brothers Co, Troy, Ohio, claims. Unit operates on 110 or 220 v, single phase, 50 or 60 cycles, ac, and is portable.

Medallion Home subdivision of 1,680 homes will be constructed in southern California. Arthur R. Ellis, residential building consultant for San Diego Gas & Electric Co, reports more than 200 builders have participated in Medallion Home program since it started two years ago, and 1,500 Medallion Homes have been completed with 1,500-2,000 more planned for this year.

Homeowners are not buying as many 100-w **light bulbs** as they used to, Cleveland Plain Dealer reports. They're switching to 60 and 70 w because they are using more lamps around the house and can cut down the higher wattages, paper says.

School officials in an Ohio community have requested school personnel to help reduce operating budget by cutting down on use of **electric lights.** Illumination was largest expense — $61,401 — last year. Lights burning in unoccupied classrooms and gymnasiums were singled out as a principal cause of high bills.

Customers in TVA area will get **outdoor lighting** with an electric eye and be able to pay for it on a fixed monthly basis. Under plan, power boards will erect a pole and run as much as 150 ft of wire to a fixture on top of the pole. Board will service installation and replace bulbs as needed. Cost for power and equipment will be $2.75 a month if 150-w bulb is used; $3.00 for 300 w.

National Wiring Bureau has split its **wiring magazine** into two editions. Now, *Wiring Promotion Reporter* will be edited for those members of the local electric industry who initiate action among their associates—utility personnel, manufacturers representatives, distributors, etc. *Profit Idea Digest* will be 4-p newsletter edited exclusively for electrical contractors, and will contain both commercial and residential news.

ANNOUNCING A NEW ORGANIZATION:

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DIVISION OF THE DOW CHEMICAL COMPANY

formed to offer the CHEMICAL CLEANING SERVICES

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Dow Industrial Service will be an organization devoted exclusively to helping you solve maintenance and disposal problems. It will offer an expanded scope of operations designed to be of greater service to all types of industry.

- The new organization will offer the cleaning services proved in plants throughout the U. S. by Dowell during the past 20 years.
- Chemical cleaning personnel will be the same engineers and operators you have known in Dowell.
- Specialized cleaning equipment will be provided from the same stations and offices—located in major industrial areas.
- The research program which has provided many major advances in cleaning techniques and chemicals will be continued — and expanded.

Dow Industrial Service will welcome the opportunity to discuss your cleaning problems on all kinds of equipment in all industries—steam generators, process equipment, heat exchangers, towers, water and product lines, water wells and tanks.

The new organization will also offer consulting services, and a line of chemical products for use in water and waste treatment.

Dowell will continue to offer services and products to the drilling and producing segments of the oil industry.

For service or more information call the office or station near you. Or write Dow Industrial Service, 20575 Center Ridge Road, Cleveland 16, Ohio.

Chemical Cleaning Services for all industry

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DIVISION OF THE DOW CHEMICAL COMPANY

DOW

Bolton Elected Hartford Electric Financial VP

Hartford Electric Light Co has elected Charles Bolton financial vice president.

Comptroller for the past two years, he will continue to hold this position in addition to his new responsibilities.

Bolton served in the accounting department of Connecticut Power Co, now integrated with HEL, for 36 years. Prior to joining the power company, he worked as an accountant for Stone & Webster Co of Boston and served with Tampa Electric Co as assistant chief clerk, and then with Key West Electric Co.

At Connecticut Power he was assistant secretary, vice president-secretary treasurer, and financial vice president.

Bonner, Fisher Named Vice Presidents at PG&E

John F. Bonner has been elected vice president in charge of engineering, and E. Howard Fisher, vice president in charge of gas operations at Pacific Gas & Electric Co.

Bonner had been assistant to Walter Dreyer, whom he replaces, since 1955. Dreyer has retired. Bonner joined PG&E in 1937 as an assistant hydrographer, after gathering extensive engineering experience through summer jobs with the U. S. Forest Service, Alcoa Ltd, the U. S. Corps of Engineers, and Western Gold Inc, a mining company.

Dreyer served with PG&E for 43 years. He became chief engineer in 1944 and was elected vice president and chief engineer in 1952.

Fisher was formerly an executive of the Coast Counties Gas & Electric Co, which was merged with PG&E in 1954. He joined the Pacific Public Service group of companies in 1930.

BONNER FISHER

He was manager of the pipeline department of Pacific Public Service Co from 1944 to 1951, and has been general superintendent of pipeline operations since 1954.

GE Appoints McCune VP-Engineering Services

Francis K. McCune has been appointed vice president-engineering services for the General Electric Co.

In his new post, McCune will be concerned with effective direction of the effort and use of GE's engineering resources. He will be a member of the company's Executive Office, the senior management body which is charged with providing long-range planning and guidance for the company.

McCune began his career with GE in 1925. He subsequently held positions in Schenectady and other offices of the company until 1952 when he was named assistant manager of engineering for the company as a whole.

In April, 1953, he became general manager of the Atomic Products Division, and in 1954 was elected a vice president. In February, 1959, McCune was named to head up atomic business development for the company's marketing services.

PS of Indiana Revamps Engineering Department

Public Service Co of Indiana has reorganized its engineering department. Walter A. Schulz (above), a 33-year veteran of the utility, and former supervisor of general engineering, has been appointed chief electrical engineer.

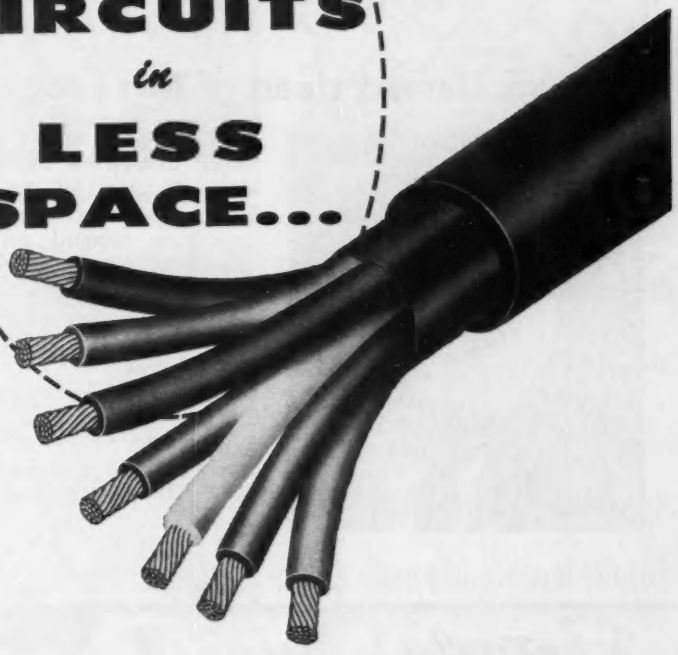
W. O. Montgomery has been named system planning manager; L. A. Crews, general construction superintendent; and H. L. Hess, planning engineer. L. M. Isom, J. E. McKinster, and S. Q. Turley have been appointed electrical engineers, and R. H. Johnson has been named construction superintendent.

Santos Named VP of A&FP Ecuador Affiliate

Anibal Santos has been appointed vice president-operating manager of Empresa Electrica de Ecuador, Inc, which is an affiliate of American

(*Continued on page* 78)

FOR MORE CIRCUITS *in* LESS SPACE...



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SUPERIOR CABLE CORPORATION

Hickory, North Carolina

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(*Continued from page* 77)
& Foreign Power Co, Inc.

He joined the utility as an assistant to the mechanical engineer of the Guayaquil diesel electric generating station in 1928. A year later he was named mechanical engineer. He was general superintendent of the utility from 1937 to 1944.

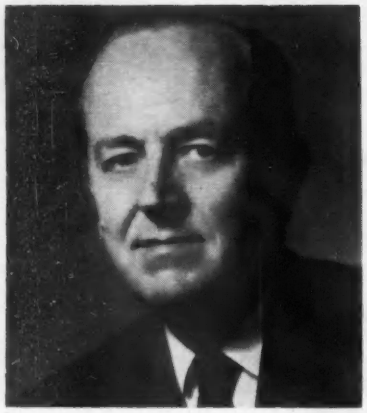
For the next year Santos was in the export division in the New York office of Combustion Engineering Co. From 1945 to 1948 he was operating manager of Cia. Colombiana de Electricidad, an affiliate of A& FP, and then Santos returned to Guayaquil in 1948 as operating manager.

Allen Appointed EEI Washington Representative

J. Scribner Allen has been appointed sales representative in Washington, D. C. for the Edison Electric Institute Sales Division. In his new post Allen will be available to provide information to government agencies in connection with the supply and application of electricity for various projects and developments. He will not be concerned with legislative or political activity, EEI officials pointed out.

Allen joins EEI after three years with American & Foreign Power Corp where he served as a consultant for sales and area development. Prior to that he was with General Electric Co for 10 years as a sales engineer and product specialist in its producer goods department.

Messick Named Head of MH Program



Laurance C. Messick has been named director of the Medallion Home Program for the National Electrical Manufacturers Assn. The association assumed national responsibility for the administration of the program this year.

Messick has been manager of the National Lighting Bureau at NEMA. Before that he was with McGraw-Hill Publishing Co, and Haire Publishing Co.

While with NEMA he has helped develop the Certified Lighting and Eye-Fi Re-Lighting programs.

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Joslyn VP's Relocate; Another Retires

Joslyn Mfg & Supply Co has made some organizational changes.

Vice President Robert F. Dolan, who has been in charge of the company's Pacific Division, will be located in Chicago. He will be in charge of all production nationally, other than wood products and the Stainless Steels Division.

Robert H. Gasch, vice president, who has been in charge of the Joslyn New York, Southeast and Gulf Divisions, with headquarters in New York, will also be located in Chicago. He will be in charge of all sales and marketing nationally, other than Stainless Steels Division.

B. M. Smalley, executive vice president, has retired after 42 years of service.

Copperweld International Names Executive VP

Erling Ringstad, manager of Copperweld Steel International Co since its inception in 1944, has been named executive vice president.

He joined the company in the sales department in 1936. For many years prior to that he was engaged in transmission and distribution engineering work with Electric Bond & Share Co in Argentina and New York, and with Duquesne Light Co.

Zinder Appoints Schultz To Engineering Staff

H. Zinder & Associates has appointed Allan Schultz to the power systems engineering staff. Schultz had been with the electric utility engineering section of General Electric Co for 12 years.

Schultz, who will be based in the Zinder New York office, is an author of numerous papers in the field of switching surges and lightning.

PERSONAL BRIEFS

Fred Stickney has joined the Live Better Electrically program staff of Edison Electric Institute.

Kentucky Public Service Commission's new chairman is **J. David Francis.** He succeeds **James F. Gordon.**

Power Reactor Development Co has made **John S. Kemper** shift supervisor for the Enrico Fermi Plant.

Ralf Shockey & Associates, Inc, marketing consultants, have celebrated their tenth anniversary.

Dr Martyn H. Foss has been appointed Associate Director of the Particle Accelerator Division at the Argonne National Laboratory.

Shirley R. Marsh has succeeded **Vic McMullen** as chairman of the Washington Power Advisory Council.

New Mexico Public Service Commission has hired **Howard Price** as an engineer.

Electrical Assn of Philadelphia has re-elected **R. G. Rincliffe,** president of Philadelphia Electric Co, as president. Others re-elected are: **Thomas P. Jones,** vice president of Westinghouse Electric Corp, vice president; **Philip H. Ward Jr,** of Ward Electric Co, treasurer; and **William E. Rubert,** of Union Electric Contracting Co, as secretary of the association.

W. M. Marr and **F. E. Bair** have retired as factory managers of the Barberton and Mansfield plants, respectively, at Ohio Brass Co. **O. L. Allanson** succeeds Marr, and **J. F. Miefert** succeeds Bair.

PAGE

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STATEMENT OF POLICY

To all users, purchasers, jobbers and distributors of products manufactured and sold by Preformed Line Products Company, Cleveland, Ohio:

It is and shall continue to be the policy of our Company to sell any and all of our products, patented or unpatented, without limitations, restrictions, conditions or "tie-in" arrangements or understandings of any kind.

It is also our policy that our jobbers and distributors may handle whatever competitive products they choose.

We reserve the right to select our own customers, jobbers and distributors, but the retention of this right shall never be exercised as an indirect method of "tying" our products, or to establish an "exclusive dealing" policy. We also reserve the right to take legitimate and effective steps to prevent anyone from manufacturing, purchasing or using products which infringe any of our patents that have not been adjudged invalid by a competent court.

We have always subscribed to the policies announced above. If any of our sales personnel have violated these policies in the past, we sincerely apologize. Any future statements, representations or conduct in violation of these policies by anyone representing our company or selling our products should be reported directly to me.

Thomas F. Peterson
President
Preformed Line Products Co.
1668 Union Commerce Bldg.
Cleveland 14, Ohio

Soviets Say Power Goal Progress Is Improving

McGraw-Hill World News—A status report on the Soviets' seven-year plan—which began a year ago—states that generation of electricity increased from 233-billion kwhr in 1958 to 264-billion kwhr last year. The plan's goal is 500-billion kwhr per year.

The Central Statistical Board of the U.S.S.R. Council of Ministers said some 5.5-million kw of new capacity was put into operation in 1959, the 500-kv line between Stalingrad and Moscow went into operation, and nine hydro units rather than five that were planned went into operation at the Stalingrad hydro plant.

The report did not mention nuclear power plants. It pointed out, however, that "work continued on the establishment of a single power grid for the European part of the Soviet Union; it now has united 23 power systems."

Farm electrification was not mentioned either, but recent articles in the press have urged increased use of wind-driven generators instead of long transmission from central stations.

Gas turbines, generators for turbines and electric motors with 100-kw capacity or less were among items where production fell below goals, the report says, although output on these items was higher than in 1958.

Market-Value Sales Urged For Oroville Dam Power

California Gov Edmund G. Brown announced recently that the power available from Oroville Dam "should be sold at market value." Oroville is to be built in connection with a proposed $1.75-billion, 25-year comprehensive water-development program for the entire state.

Brown, in discussing the power aspects of the water program, also made these points:

- In the early years of the program, it is expected to consume more power than it produces. "This is caused by the tremendous electrical energy needed to pump water over long distances and high mountains. Since over the long run this will be a power-deficient project, we are unable to embark on a substantial power marketing program. There is thus little reason to become involved in the public-vs-private power controversy."
- Power generated from dams in the program will be sold under a preference policy. "I also want to emphasize that to the extent power is available, it shall be sold under provisions of existing law which grants a preference in such sales to public agencies."

Brown emphasized that the program is primarily one of water development, with power generation being incidental.

Housing Development Bid To Become Utility Denied

The New York Public Service Commission has denied the petition of a Niagara Mohawk Power Corp customer that sought authority to resell electricity and gas. The ruling said that the recently formed Atomic Park Electric & Gas Co, Inc, of Albany "has not proved that it is in the public interest to permit the creation of a public utility whose sole reason for existence is to continue via a legal fiction the parasitic practice of submetering electricity or gas."

Instead of benefitting the housing development's tenants, "the only ones who will benefit by Atomic Park's operation as a utility are Adams Park Associates [the parent firm of the petitioner] . . ."

Last year the commission found that Adams Park Associates' submetering practice was in violation of NM's tariffs and ordered the power company to stop serving the housing development unless the practice halted.

A commission examiner said the Adams Park firm has a legal right to supply utility service to tenants without PSC authority, "but may not make specific charges for such services." This could be accomplished by including the service within rents. He also said it would not be in the public interest to require one utility to furnish the entire needs of a proposed competing utility which would serve customers within the former's franchised area.

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3	5000	G.E.	72,000—2,300
1	3750	G.E.	69,300—13,200, 3 Ph.
1	3000	G.E.	69,000—4,340, 3 Ph.
3	667	G.E.	66,000—11,500/2300
3	500	G.E.	66,000/33,000—2300/13200
3	500	West.	66,000—11,500/2300
3	500	Wagner	69,000—460
1	2500	Mol.	44,000—2400/4160, 3 Ph.
2	2500	Wagner	45,800/22,900—4160Y, 3 Ph.
3	200	West.	44,000—480
1	5000	West.	34,500—13750/6875, 3 Ph.
1	4500	West.	33,000—2500/4330, 3 Ph.
2	3000	Upef.	34,750—4160, 3 Ph.
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2	1500	G.E.	34,400—2520, 3 Ph.
3	1250	A.C.	33,000—480
3	500	Mol.	34,500—2300/4650
3	200	A.C.	34,500—2400/7200/12740Y
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3	833	A.C.	26,400—480
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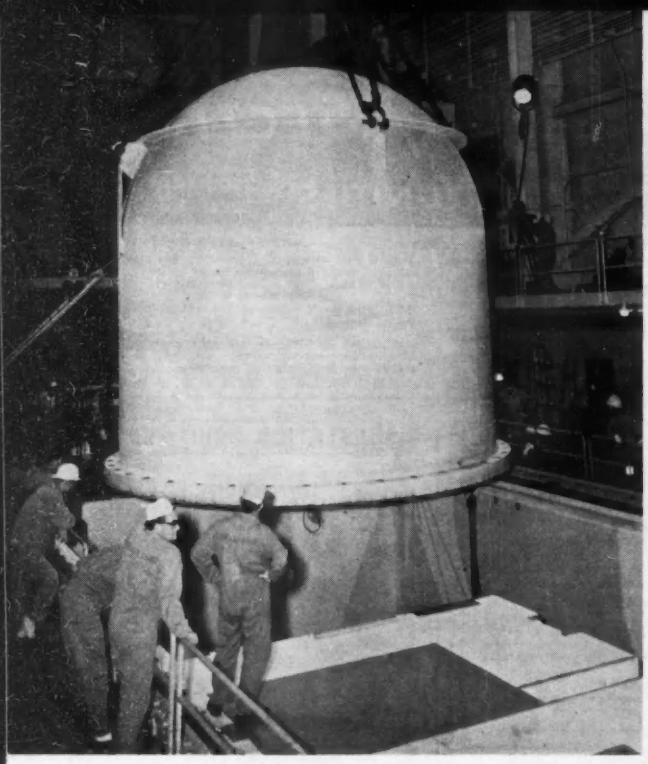

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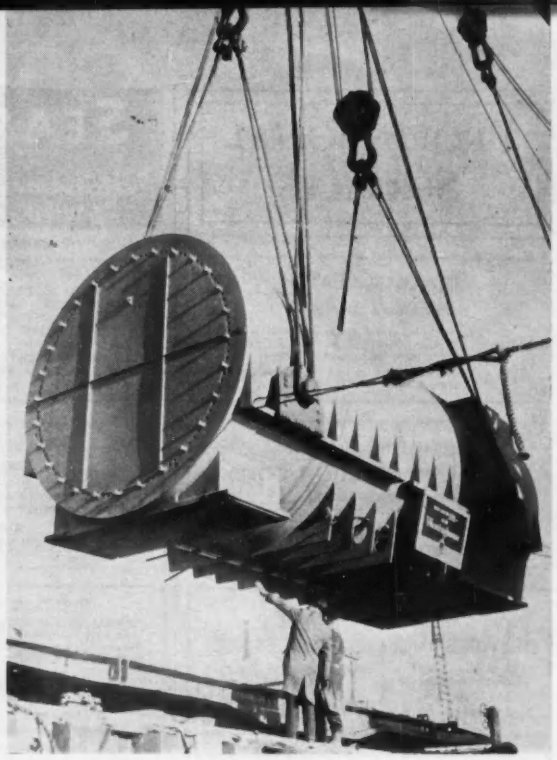


and on the way to Indian Point . . .

Big Lifts Speed Work at Two Atomic Plants

The first refueling operation at Shippingport and delivery of the 275-Mw generator for Indian Point are depicted above. Duquesne Light Co is conducting the refueling, left, for the Atomic Energy Commission. The first seed of enriched uranium produced 388-million kwhr during a total of 5,806 full power hours, or 2,806 full power hours greater than design life. The reactor began operating Dec. 2, 1957 and since then produced energy equivalent to the burning of about 170,000 tons of coal. Assisting Duquesne is the Bettis Atomic Power Laboratory, a Westinghouse Electric Corp affiliate.

One of the tense moments during delivery of the generator for the Consolidated Edison Co of New York, Inc, nuclear plant at Indian Point occurred at Jersey City last month. The 224-ton stator and the 105-ton rotor of the generator were transferred there from railroad car to barge for the 24-mile Hudson River trip to the plant. Construction of the $100-million station is proceeding on schedule, Con Ed says. Among recent visitors to the plant were city labor leaders who hailed Con Ed's cooperation in handling the effects of automation in utility work during past decades.

Advertising Index

Allis-Chalmers Mfg. Co. 51, 53
American Chain & Cable Co., Inc. Page Fence Ass'n. 79

Babcock & Wilcox Co. 8, 9
Bethlehem Steel Co. 67
Blackburn Corp., Jasper 4

Directory of Engineers 81
Dow Industrial Service 75

Ebasco Services, Inc. 73
Electric Machinery Mfg. Co. 28, 29
Electrical World 24, 25
Engineers, Directory of 81
English Electric Co., Ltd. 62

General Electric Co.
Apparatus Dept. ..... 2nd Cover, 49
Graybar Electric Co., Inc. 7

Hotpoint Div. General Electric Co. 26

Indiana Steel & Wire Co., Inc. 61

International Business Machines Corp. 18

Kearney Corp., James R. 27
Kerite Company 30

Lapp Insulator Co., Inc. 6
Line Material Industries 23

Moloney Electric Co. ..... 4th Cover

Ohio Brass Co. 15
Osmose Wood Preserving Co. of America, Inc. 60

Page Fence Ass'n.
American Chain & Cable Co., Inc. ... 79
Pennsylvania Transformer Div., McGraw-Edison Co. 10, 11

RT&E Corp. 57
Reliable Electric Co. ..... 3rd Cover
Revere Copper & Brass, Inc. 59
Rome Cable Div. of Alcoa 12, 13

S&C Electric Co. 68, 69
Searchlight Section 81
Shaw-Perkins Mfg. Co. 78
Superior Cable Corp. 77

United Engineers & Constructors, Inc. 14

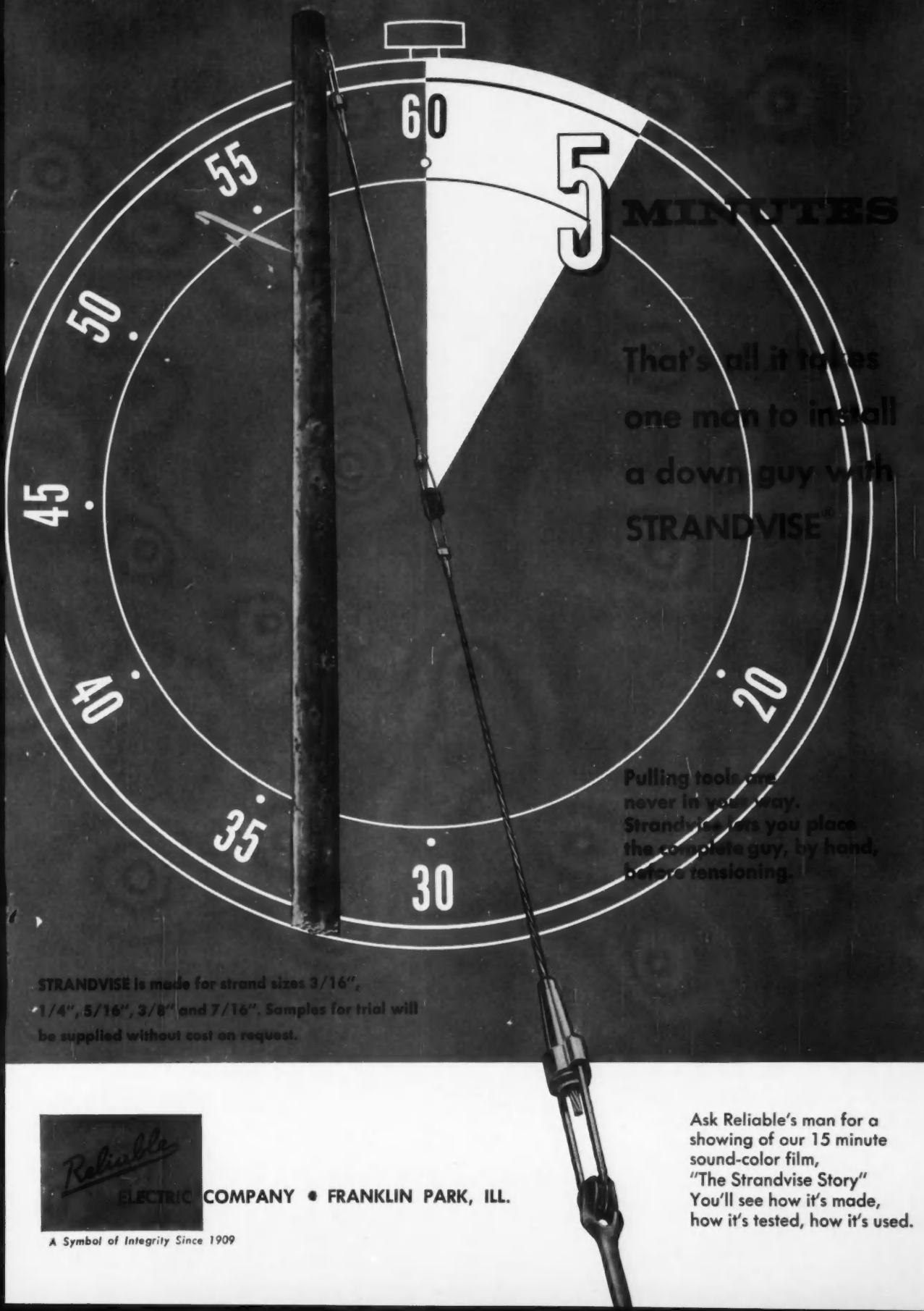
Wagner Electric Corp. 16, 17
Westinghouse Electric Corp. 54, 55

PROFESSIONAL SERVICES 81

CLASSIFIED ADVERTISING
F. J. Eberle, Business Mgr.

EMPLOYMENT OPPORTUNITIES 81

EQUIPMENT
(Used or Surplus New)
For Sale 81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Pulling tools are never in your way. Strandvise lets you place the complete guy, by hand, before tensioning.
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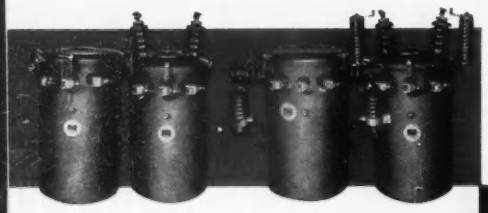
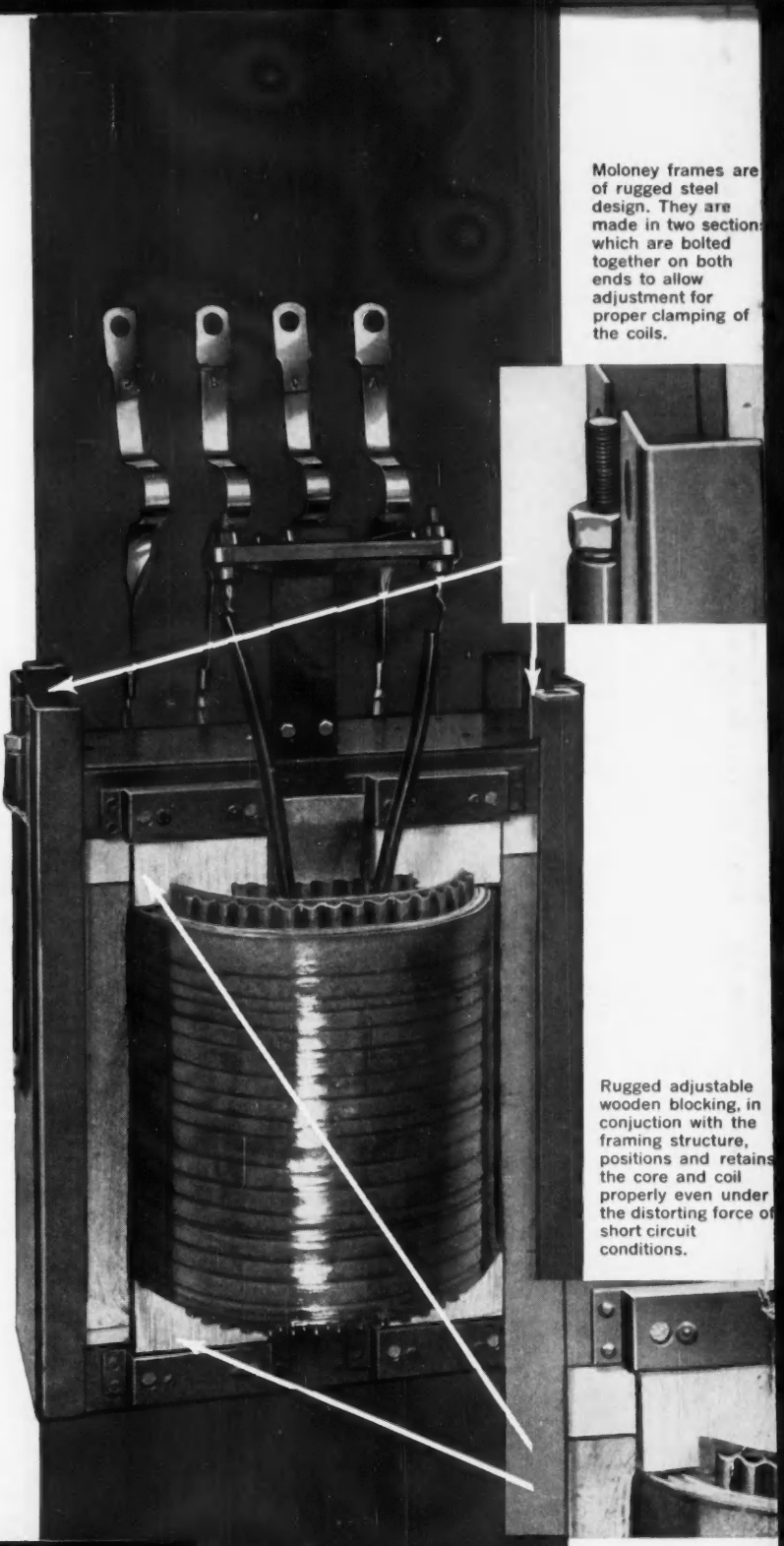
The unique combination of the Moloney Core, a low impedance coil, sturdy frames and adjustable blocking gives the user of Moloney distribution transformers efficiency, economy and long service.

- Moloney Core has low exciting current.
- Low impedance coil improves voltage regulation.
- Sturdy frames assure a rugged, compact unit.
- Adjustable wood blocks retain the coils in position even under short circuit conditions.

Specify the distribution transformers designed, built, and tested for superior performance. Specify Moloney Transformers . . . All Along The Line.





Moloney frames are of rugged steel design. They are made in two sections which are bolted together on both ends to allow adjustment for proper clamping of the coils.

Rugged adjustable wooden blocking, in conjuction with the framing structure, positions and retains the core and coil properly even under the distorting force of short circuit conditions.

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